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RAC V

RESPONSE ACTION CONTRACT FOR

Remedial, Enforcement Oversight, and
Non-Time Critical Removal Activities at Sites of Release
or Threatened Release of Hazardous Substances in Region V

FINAL 2006 CLEANUP STATUS REPORT VELSICOL CHEMICAL/PINE RIVER SITE

St. Louis, Michigan

Phase 2 Remedial Action
WA No. 208-RARA-0532/Contract No. 68-W6-0025
December 2006

PREPARED FOR

U.S. Environmental Protection Agency

PREPARED BY

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Contents

Tables

Figures

Appendixes

Acronyms and Abbreviations

µg/kg	micrograms per kilogram
µg/m³	micrograms per cubic meter
ATL	Air Toxics, Limited
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense nonaqueous phase liquid
E&E	Ecology & Environment
EQM	Environmental Quality Management
FMSL	feet mean sea level
GCS	groundwater collection system
gpm	gallons per minute
HBB	hexabromobenzene
HDPE	high-density polyethylene
HI-Vol	high volume
mg/kg	milligrams per kilogram
NA	not analyzed
NAAQS	National Ambient Air Quality Standards
NAPL	nonaqueous phase liquid
NES	National Environmental Services Corp.
NR	not recorded
NTU	nephelometric turbidity unit
OSHA	Occupational Safety & Health Administration
OU1	Operable Unit 1
OU2	Operable Unit 2
PBB	polybrominated biphenyl
PEL	permissible exposure limits
ppb v	parts per billion volume
ppm	parts per million
QA/QC	quality assurance/quality control
RA	remedial action
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
Site	Velsicol Chemical/Pine River Site
TSP	total suspended particulate
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

WA	Work Assignment
WTP	water treatment plant
yd^3	cubic yard

1. Introduction

CH2M HILL prepared this report for the U.S. Environmental Protection Agency (USEPA) under Work Assignment (WA) No. 208-RARA-0532, Contract No. 68-W6-0025. This report documents the remedial activities for Operable Unit 2 (OU2) performed at the Velsicol Chemical/Pine River Site (herein referred to as the Site) in St. Louis, Michigan (see Figure 1) during the 2006 construction season. CH2M HILL and team subcontractor, Ecology & Environment (E&E), performed the construction activities in general accordance with design documents prepared under WA No. 017-RDRD-0532. CH2M HILL's subcontractor for the 2006 season was National Environmental Services Corp. (NES) of Bloomington, Indiana.

Remedial activities at the Site have been ongoing for several years. In 1998 and 1999, an emergency removal action was conducted at the Site to construct infrastructure and remove the most highly contaminated sediments from the Pine River adjacent to the main plant site. The remedial action (RA) at the Site began as the removal action was completed. Sheet pile installation commenced in October 1999 and sediment excavation began in July 2000. Seasonal work has continued at the Site in each of the following years, typically between April and December. Phase 1 of the RA, which was completed in 2003, involved the remediation of sediments from the southern half of the Pine River. Phase 2, which consisted of remediating the river's northern half, commenced in 2004. During the 2005 season, Cell 8 and the Mill Pond Cell were completely remediated and work in Cell 7 was completed. Figure 2 shows all cells remediated during the project along with the year or years the cell was remediated.

During the 2006 season, the "Phase 1 Cell" (specifically, the former footprints of Cell 4, the Hot Spot Cell, Cell 1, 2, 3, and the equalization basin combined) was dewatered and all of the infrastructure related to remedial activities was removed, with the exception of some sheet piling left in place in the river (described in Section 3.14, Sheet Piling Removal). The water was treated at the onsite water treatment plant (WTP) and discharged back into the Pine River. The onsite WTP, operated by Environmental Quality Management (EQM) of Cincinnati, Ohio, is under a separate contract to USEPA and not addressed in this report.

The previous removal action and RA work are documented in the following reports and not addressed in this report:

- *Removal Summary Report* (Ecology & Environment, 2000)
- *Year 2000 Cleanup Status Report* (CH2M HILL, 2001)
- *Year 2001 Cleanup Status Memorandum (*CH2M HILL, 2002a*)*
- *2002 Cleanup Status Report (*CH2M HILL, 2003a*)*
- *NAPL Investigation Summary Report (*CH2M HILL, 2003b*)*
- *Final 2003 Cleanup Status Report (*CH2M HILL, 2004*)*
- *Final 2004 Cleanup Status Report (*CH2M HILL, 2005*)*
- *Final 2005 Cleanup Status Report* (CH2M HILL, 2006)

2. Chronology of Events During the 2006 Construction Season

This section is a general description of the schedule and progress of the 2006 remedial activities. Additional detail concerning specific aspects of the remedial activities is included in Section 3, Construction Activities. Photos of the 2006 construction activities are included in Appendix A.

March 2006. CH2M HILL mobilized to the Site for the 2006 construction season, which included maintenance and calibration of air monitoring equipment.

April 2006. NES mobilized to the Site. Chain-link fencing was removed from the perimeter of Cell 7, Cell 8, and Mill Pond. A total of 560 linear feet of fencing was installed along the south shoreline of Cell 1, 2, 3. The groundwater collection system (GCS) installed in the nonaqueous phase liquid (NAPL) collection trench manholes in 2005 was tested. Mass dewatering of the Phase 1 Cell was started and completed, and maintenance dewatering began. Dewatering of the manholes was started. All water requiring treatment was routed to the equalization basin (in the river) initially, but was later routed to the equalization tank EQM installed on land on the northwest side of the WTP to allow removal of the equalization basin later in the season.

NES removed the sheet piling that formed the silt box in the equalization basin. CH2M HILL performed the post construction inspection of the Mill Street Bridge on April 26, and NES arranged for the necessary repairs to be made.

May 2006. Maintenance dewatering of the Phase 1 Cell and dewatering of the manholes continued. Repairs to the curbing, sidewalks, and surface of Mill Street were performed. The 14-day initial air monitoring event was completed and the periodic (6-day) air monitoring program was initiated. NES constructed a berm (which was also used as a haul road) around the perimeter of the equalization basin using clean fill to isolate it from the clean area. Removal of the north/south haul road began. All sheet piling was removed from the equalization basin and the north/south haul road. NES also removed the few remaining pieces of sheet piling in Mill Pond that proved too difficult to remove by barge the previous year.

NES installed sheet piling to create a new dock west of the former location of Cell 5 and began backfilling the new dock using material from the base of the north/south haul road (after analytical testing verified that the material was clean).

Stabilization and excavation of material from the equalization basin began. Offsite disposal of material also started. Samples were collected from the upper portion of the east/west haul road and the equalization basin to determine the appropriate disposal location.

June 2006. Maintenance dewatering of the Phase 1 Cell and dewatering of the manholes continued. The 6-day air monitoring program continued. Installation of the new dock was completed. Removal of the east/west haul road was completed. All sediment from the equalization basin was stabilized and excavated. Offsite disposal of material continued.

NES restored grassy areas in Penny Park and near the Mill Street Bridge that had been impacted by remedial activities.

July 2006. Maintenance dewatering of the Phase 1 Cell and dewatering of the manholes continued. The 6-day air monitoring program continued until July 14, when it was completed due to the end of excavation activities. NES excavated some contaminated glacial till from the bottom of the equalization basin footprint. The southeastern segment of the NAPL collection trench leading to Manhole 1 was extended along the shoreline where the equalization basin was formerly located and the lateral segment leading out along the former location of the east/west haul road was abandoned. Offsite disposal of material continued.

Final confirmation sampling of the equalization basin footprint was completed. A post excavation topographic survey was performed. A high-density polyethylene (HDPE) liner was installed over the shoreline and covered with a layer of imported sand. The entire shoreline and footprint where the equalization basin was formerly located was capped with 2 feet of imported clay. A post capping topographic survey was performed.

Riprap was placed over the portion of the shoreline that was subject to erosion from wave action, and NES restored the portion of the shoreline where grass had previously been growing.

Sheet piling removal equipment was mobilized to the Site, and NES actively filled all cells to prepare for sheet piling removal.

August 2006. Sheet piling removal was completed. NES began fence replacement and repair, site restoration, and cleanup.

September 2006. Site restoration, cleanup, dense nonaqueous phase liquid (DNAPL) pumping and removal, and demobilization of equipment were conducted. Modifications to the GCS to accommodate pumping of water to the process pad were conducted.

3. Construction Activities

3.1 Chain-link Fence Work

Shortly after mobilizing to the Site, NES removed 2,697 linear feet of chain-link fencing along the shoreline of former Cells 7 and 8 and around the shoreline of Mill Pond. NES then installed 560 linear feet of chain-link fencing along the shoreline of former Cells 1, 2, and 3 in preparation for dewatering the Phase 1 Cell. Black plastic privacy screening was attached to the fence using zip-ties along its entire length. CH2M HILL/E&E secured access agreements from the landowners where the fence had to be installed on private property.

After the work was completed in the Phase 1 Cell and the cells were filled with water again, NES removed all remaining chain-link fencing that had been installed outside of the Site boundaries during the RA. A total of 3,887 linear feet of chain-link fencing was removed during the 2006 construction season.

In addition to chain-link fence installation and removal outside of the Site boundaries, NES replaced and/or repaired some chain-link fencing around the perimeter of the Site that had been damaged or modified during the RA. The large double swinging gate that allowed access to the east/west haul road was replaced with solid fence sections. The gate in front of the equalization basin was left in place to allow access to the river by small boats. The gate from the east/west haul road was installed where the new dock was constructed west of the former location of Cell 5. The perimeter of the new dock was also completely fenced to prevent recreational boaters from using it as a docking point. When the dock is used in the future, the outer fencing must be removed.

3.2 Mill Street Bridge Inspection and Repair

In 2005, NES had constructed a temporary haul road across Mill Street approximately 40 feet north of the north pier of the Mill Street Bridge. The guardrails were removed on both sides of the street, pipes were laid along both curbs to convey stormwater past the temporary haul road, and concrete ecology blocks were placed along the edge of the road. Clean fill was used to construct the haul road, including the access ramps into Cell 8 and the Mill Pond Cell. The haul road was removed and Mill Street was opened up to traffic in December 2005.

On July 8, 2005, CH2M HILL had conducted a preclosure inspection of the Mill Street Bridge and nearby structures (that is, curb and gutter, sidewalks, etc.) that documented the preclosure condition. Removal of the temporary haul road over Mill Street in December 2005 exposed some surficial damage to the roadway, curbing, and sidewalks. A formal post construction inspection was performed by CH2M HILL on April 26, 2006, that documented the condition of the bridge and nearby structures. All significant damage that occurred between the two inspections was repaired by NES in May 2006.

Copies of the July 21, 2005, report (covering the July 8, 2005 inspection) and the June 20, 2006 report (covering the April 26, 2006 inspection) are included in Appendix B. Copies of the Mill Street Bridge inspection reports generated by Spicer Group, Inc., a consultant for the City of St. Louis, dated April 28, 2004 (covering an April 13, 2004 inspection), and March 15, 2006 (covering a March 14, 2006 inspection) are also included in Appendix B. The findings of CH2M HILL's preconstruction and postconstruction inspections were similar to those of the City's consultant.

3.3 Dewatering

3.3.1 Remedial Cells

NES performed mass dewatering of the Phase 1 Cell in April, during which time the water in the Phase 1 Cell was pumped directly over the sheet pile wall to the other side of the river. Mass dewatering was performed using two 6-inch pumps and one 12-inch pump, with a total flow rate of approximately 9,000 gallons per minute (gpm).

Maintenance dewatering began after completion of mass dewatering. Unlike previous years, when maintenance dewatering was performed by routing water to the WTP, the majority of the water infiltrating into the dewatered Phase 1 Cell was kept separated from the contaminated work area and pumped back over the sheet pile wall directly into the river. A berm of clean imported fill was built around the equalization basin and east/west haul road to create this barrier, and only water entering the bermed area was pumped to the equalization tank for subsequent treatment at the WTP (refer to Figure 3).

Dewatering of the Phase 1 Cell was terminated and the cell was pumped full of water in late July. Active filling of the cell was necessary so that sheet piling removal could start as soon as possible. The WTP was shut down and decommissioning of the plant began as soon as dewatering ended.

3.3.2 NAPL Collection Trench Manholes

Removal of water from the NAPL collection trenches reduces the potential for migration of Shallow Unit groundwater into the river and reduces the upward hydraulic force exerted on the riverbank and riverbed caps. This was especially critical during the 2006 construction season since the Phase 1 Cell was dewatered, and not dewatering the NAPL collection trenches would have created between 15 and 20 feet of driving head that could have caused migration of contaminated groundwater from the trenches into the dewatered cell.

Dewatering of the trenches was done using a 3-inch diaphragm pump (the GCS could not be used for dewatering the trenches because the maximum drawdown achievable using the GCS was insufficient—see the explanation under Section 3.16, Modification of the Groundwater Collection System). The diaphragm pump was moved from manhole to manhole every few days to maintain drawdown below the water level in the dewatered cell. All groundwater removed from the NAPL collection trenches was pumped to the equalization tank and subsequently treated at the onsite WTP.

Dewatering of the NAPL collection trenches began in April in advance of dewatering of the Phase 1 Cell. Dewatering of the trenches ceased in late July when the WTP was decommissioned.

3.4 Sheet Pile Wall Maintenance

Many of the sheets that comprise the walls of the remedial cells at the Site had been slightly damaged because of the extreme force required to drive them into place through the very dense glacial till underlying the sediments in the river. Occasionally, a boulder was present in the till, which caused a larger potential for damage to sheets during driving. The interlocks between the sheets sometimes spread from these driving forces, causing small gaps through which significant water infiltration could occur during dewatering.

Minimizing the amount of water infiltrating into the cells typically required daily maintenance of the joints in the sheet piling. NES performed sheet piling joint maintenance by having two workers go around the outside of the sheet piling on a barge, pouring a mixture of cracked corn, sawdust, and sand into the water next to leaking joints. The cracked corn, sawdust, and sand were carried into the joint by the water flowing through it. A suitable gradation of the mixture would lodge in the joint, and fine particles already present in the river water infiltrating through the joints would further seal the porous spaces between the cracked corn and sand.

3.5 Onsite Laboratory

The onsite laboratory has been operated by EQM since the start of the removal action in 1998 and has been used to analyze soil and water samples for the six isomers of dichlorodiphenyltrichloroethane (DDT) (“total DDT”), hexabromobenzene (HBB), and polybrominated biphenyl (PBB) (HBB analyses were dropped in 2005, although some results were reported for a few samples in 2006). Some of the results from the onsite laboratory received in early June of the 2006 season seemed anomalously high (for example, exploratory sampling of some material indicated total DDT concentrations in the hundreds of milligrams/kilogram [mg/kg], but subsequent post-stabilized samples of material from the same area indicated total DDT concentrations in the tens of thousands of mg/kg). A calculation error was determined to be the cause for the discrepancy, and the lower concentrations were determined to be correct. Therefore, questionable results previously issued in 2006 were reviewed and some revised results were provided. The results given in this report reflect corrected values.

Between the time the first anomalously high results were received (June 7) and the source of the error was determined and corrected results reported (June 23), considerably more samples were submitted to the offsite laboratory, including 12 split duplicate samples collected on June 14 to compare the onsite and offsite laboratory results. The offsite laboratory sample results confirmed that the onsite lab results with concentrations in the tens of thousands of mg/kg total DDT were in error. The results of the June 14 quality assurance/quality control (QA/QC) sampling are described below in Section 3.6, Exploratory Sampling.

3.6 Exploratory Sampling

Exploratory samples were typically collected in advance of excavation activities to give an indication of whether the material could be disposed at a Subtitle D landfill, a Subtitle C landfill, or whether it was contaminated at all. A total of 56 exploratory soil samples were collected during the remedial activities in 2006. Additionally, 13 duplicates were submitted to the offsite laboratory for QA/QC purposes. All exploratory sampling results are shown in Table 1.

On May 10, six exploratory samples were collected from the north/south haul road after the top 2 feet were scraped off and stockpiled for eventual disposal at a Subtitle D landfill. These samples were submitted to the onsite laboratory. No DDT isomers or PBB were detected in any of the six samples, so some of the material was used as backfill for a new dock constructed to the west of the remedial area (see Section 3.10, Installation of New Dock), and the remaining soil was left in place after the culverts were removed.

On May 20, eight exploratory samples were collected from the east/west haul road to determine if the material could be disposed of offsite at a Subtitle D landfill or if it required disposal at a Subtitle C landfill. These samples were submitted to the onsite laboratory. Analytical results indicated the total DDT concentrations in the eight samples ranged between non-detect and 3,260 mg/kg, averaging 1,911 mg/kg. It was determined that material from the east/west haul road could be disposed of at a Subtitle D landfill.

On May 22, six random exploratory grab samples were collected of sediment that had settled in the equalization basin to determine if the material could be disposed of offsite at a Subtitle D landfill or if it required disposal at a Subtitle C landfill. These samples were submitted to the onsite laboratory. Analytical results indicated the total DDT concentrations in the six samples ranged between 264 and 343 mg/kg, averaging 309 mg/kg. It was determined that this material could be disposed of at a Subtitle D landfill.

On June 2, an exploratory sample was collected of the material from the southwest shoreline of the equalization basin and submitted to the onsite laboratory. Analytical results indicated the total DDT concentration in the sample was 5,983 mg/kg. This portion of the shoreline was subsequently covered with a compacted clay cap.

On June 6, two exploratory samples were collected of the sandy gravel material immediately overlying the glacial till underneath the former location of the equalization basin cleanout road. These samples were submitted to the onsite laboratory. Analytical results indicated the total DDT concentration in the samples were 26 and 76 mg/kg. This area was subsequently covered with a compacted clay cap.

On June 8, six exploratory samples were collected: three from sediment underlying the equalization basin cleanout road after its removal, and three from sediment that had accumulated in the south side of the equalization basin. All samples were submitted to the onsite laboratory. Analytical results indicated the total DDT concentrations in the six samples ranged between 63 and 767 mg/kg, averaging 397 mg/kg. Therefore, it was determined that this material could be disposed of at a Subtitle D landfill.

On June 11, three exploratory samples were collected from sediment that had accumulated in the northeast portion of the equalization basin. All samples were submitted to the onsite laboratory. Analytical results indicated the total DDT concentrations in the three samples ranged between 117 and 1,246 mg/kg, averaging 524 mg/kg. Therefore, it was determined that this material could be disposed of at a Subtitle D landfill.

On June 13, four exploratory samples were collected: two from sand located in the north central portion of the equalization basin, and two from the glacial till underlying the sand. All samples were submitted to the onsite laboratory (one sand sample was split and submitted to the offsite laboratory as a duplicate). Analytical results indicated the total DDT concentrations in the four samples ranged between non-detect and 291 mg/kg, averaging 85.2 mg/kg. The sand was subsequently excavated and disposed of offsite at a Subtitle D landfill, and the glacial till was capped with clay.

On June 14, 12 samples were collected, split, and submitted to the onsite and offsite laboratories as duplicate samples for the purpose of comparing the onsite and offsite results (as described in Section 3.5, Onsite Laboratory, this was after the discrepancy in the onsite lab results was discovered, but before the calculation error was identified and corrected results provided). Analytical results showed the total DDT concentrations in the samples submitted to the onsite laboratory ranged between 141 and 5,522 mg/kg, averaging 876 mg/kg. The offsite laboratory results showed the total DDT concentrations ranged between 91 and 5,281 mg/kg, averaging 605 mg/kg. A memorandum comparing the results for all split duplicate samples is included in Appendix C.

On June 16, an exploratory sample was collected from sand in the bottom of the equalization basin and submitted to the offsite laboratory. Analytical results indicated the total DDT concentration in the sample was 208 mg/kg. This material was subsequently excavated and disposed of offsite at a Subtitle D landfill.

On June 25, five exploratory samples were collected and submitted to the offsite laboratory. Two of these were samples of sediment underlying the east/west haul road near the shoreline where an odor was present. The total DDT concentrations in these samples were 1,744 and 1,440 mg/kg. This material was subsequently excavated and disposed of offsite at a Subtitle D landfill. Two samples were collected of sand overlying the glacial till in the equalization basin, and the total DDT concentrations in these samples were 0.13 and 0.15 mg/kg. A sample was collected from the glacial till near the center of the equalization basin, and the total DDT concentration in this sample was 0.19 mg/kg.

On July 6, two exploratory samples were collected from the shoreline slope of the equalization basin, approximately halfway down the slope, in grids Q18 and P17 (refer to the confirmation sampling grid shown in Figure 4). These samples were submitted to the onsite laboratory. Total DDT concentrations were 41 and 51 mg/kg in these samples, respectively. The locations where these samples were collected were reworked, covered with an HDPE geomembrane, and capped with clay as part of the shoreline reconstruction following installation of the additional NAPL collection trench segment in the equalization basin (described in Section 3.11, Extension of NAPL Collection Trench Segment).

3.7 Sediment Stabilization, Excavation, and Disposal

Following completion of mass dewatering and creation of the berm/haul road to isolate the contaminated work area, sediment from the haul roads and equalization basin was stabilized in situ by mixing it with pelletized lime. Although some of the material comprising the haul roads was imported soil and not truly sediment, the majority of it was stabilized sediment, and the term "sediment" is used to refer to all soil materials excavated during 2006 for the purpose of this report. The procedures were similar to those used during previous remedial work at the Site. The lime was delivered into the work area in the cell and was mixed into the soil using an excavator. When the sediment was visually determined as sufficiently dewatered for hauling, it was loaded into articulated (off-road) trucks, transported to the process pad, and stockpiled. If necessary, additional lime was added to the sediment on the process pad to dry the material to a level acceptable to the landfill.

The stabilized sediment stockpiled on the process pad was loaded into tandem dump trailers that had first been lined with straw to facilitate the process of sliding the sediment out of the trailers at the landfill. The loaded trucks moved onto the decontamination pad, where the exterior of the trucks was sprayed down with water using pressure washers. The decontamination water collected into a sump, which was pumped out to the equalization tank as needed. After decontamination personnel had removed the swing-arm stop sign to signify it was safe for the driver to proceed, trucks continued to the NES trailer to obtain paperwork, and the drivers performed a final check there to ensure that the tarp covering the load and the gate latch were secure.

Stabilized sediment samples were collected from the process pad approximately every 400 cubic yards (yd^3) for waste stream tracking. Table 2 presents the analytical results of the stabilized sediment sampling (pad samples). A total of 65 distinct stabilized sediment samples were collected and analyzed for total DDT and PBB concentrations. The majority of the stabilized sediment samples were analyzed by the onsite laboratory, but 27 samples were sent to the offsite laboratory for analysis in mid-June before the question regarding the inconsistent results from the onsite laboratory was resolved. The maximum total DDT concentration in the sediments after stabilization was 4,138 mg/kg. The average total DDT concentration was 420 mg/kg. PBB was detected in 33 of the samples (mostly from the offsite laboratory samples, since the detection limits were lower), with a maximum concentration of 20 mg/kg.

All materials were disposed of offsite at two Subtitle D landfills. The landfills that received excavated sediment during the 2006 construction season were as follows:

- Northern Oaks Landfill (Harrison, Michigan)
- Brent Run Landfill (Montrose, Michigan)

3.8 Confirmation Sampling

After removal of contaminated materials was complete, confirmation samples were collected from within each grid square in the footprint of the equalization basin to determine if the cleanup criterion of 5 mg/kg total DDT had been met. CH2M HILL/E&E field personnel performed all confirmation sampling. Confirmation sampling equipment was either used once and disposed of, or thoroughly decontaminated after each use with successive rinses of 10-percent methanol solution, Alconox® solution, and distilled water. Section 4.1, Standard No. 1—Stabilization, Excavation, and Offsite Disposal of Sediments

Containing Greater than 5 mg/kg Total DDT, contains a discussion of the confirmation sampling results.

3.9 NAPL-Contaminated Glacial Till

Sediment removal activities near the equalization basin prior to 2003 had indicated the presence of NAPL contamination in the glacial till beneath the sediment. NAPL-contaminated glacial till was encountered within the equalization basin footprint in 2006 as well. Heavily contaminated till was excavated, mixed with lime and other excavated sediment, transported up to the process pad, sampled, and eventually disposed of offsite at a Subtitle D landfill. Removal of heavily contaminated till was necessary because it was too soft to serve as a suitable foundation for a clay cap. Glacial till that was contaminated to a lesser degree was left in place and capped with imported clay (described in Section 3.11, Extension of NAPL Collection Trench Segment).

3.10 Installation of New Dock

A new access dock was installed to the west of the former location of Cell 5 in May and June 2006 (refer to Figure 3). This was necessary to provide a river access point for barges and heavy equipment to remove sheet piling at the end of the 2006 season. The dock will be necessary to perform future remedial activities for OU1, since the temporary haul roads that had been used during the OU2 remedial activities were removed in 2006. It was cost-effective to do this as part of the activities in 2006 because all of the materials (that is, sheet piling, I-beams, clean structural backfill, etc.) that were needed to build the dock could be salvaged from the temporary haul roads that were being removed, and the equipment necessary to construct the dock was already onsite.

As described previously, double-swinging gates were installed at the top of the slope where the new dock was constructed. The perimeter of the new dock was also completely fenced to prevent recreational boaters from using it as a docking point. When the dock is used in the future, the outer fencing will have to be removed and replaced when it is done being used.

3.11 Extension of NAPL Collection Trench Segment

Three NAPL collection trench segments had been installed during the 2002 season (refer to Figure 3) to collect residual NAPL present within sand seams in the glacial till after free NAPL present on the surface of the glacial till was removed and the till capped with clay. The NAPL collection trenches consisted of three separate segments along the base of the shoreline and a total of five trench laterals extending perpendicular to the shoreline. A manhole with a 3-foot sump was installed in the middle of each segment to facilitate removal of NAPL by pumping. The trenches and trench laterals were constructed of 4-inch-diameter perforated HDPE piping sloped back toward the manhole. The trenches were backfilled with 2 feet of stone fill and compacted granular fill above the stone fill after placement of the HDPE pipe. After the trenches were completed and the shoreline was cut back as necessary to establish a maximum slope of 18 degrees, a 6-inch layer of protective sand was placed and compacted up the shoreline, a 40 mil textured HDPE geomembrane was placed over the slope from top to bottom, and a second 6-inch layer of protective sand was placed over the geomembrane. Finally, a 2-foot layer of clay was placed and compacted over the entire slope and integrated with the clay placed on the floor of the remedial cells.

In 2006, test trenches were excavated into the glacial till along the shoreline where the equalization basin was formerly located after all sediment and other overlying materials had been removed to determine the extent of NAPL contamination within sand seams. Some NAPL was observed at relatively shallow depths. No contaminated sand seams were observed southeast of the midpoint of the equalization basin shoreline.

Based on the relatively limited extent of NAPL-contaminated sand seams in the glacial till, the installation of a new NAPL collection trench manhole with deeper trench segments was not necessary; rather, the existing segment running southeast from Manhole 1 was extended 207 linear feet further southeast. The extension was constructed using the same materials and in the same manner as the trench installed in 2002. After installation of the extension, the elevation of the trench segment at the point furthest from Manhole 1 is 693 feet mean sea level (fmsl), and it slopes to the sump elevation of 683 fmsl at Manhole 1 over a run of approximately 430 feet. The lateral segment that ran east along the northern edge of the east/west haul road was abandoned at the point it joined the main segment going back to Manhole 1. Updated NAPL collection trench record drawings are included in Appendix D.

3.12 Installation of Clay Cap

Since some NAPL-contaminated glacial till was left in place in the equalization basin footprint, imported clay was used to cap the till similarly to the capping done in the Hot Spot Cell, Cell 4, Area 3, and Cell 5 during previous construction seasons. The surface of the glacial till was prepared by filling in depressions, and then clay was placed in 12-inch lifts and compacted using a sheepsfoot compactor. Following installation, the minimum thickness of the clay cap was 2 feet, and the cap extended over the entire footprint of the equalization basin plus some area outside the footprint. The clay cap was integrated with the clay cap in the Hot Spot Cell installed in 2002 as well as the clay installed up the shoreline over the NAPL collection trench extension.

Density testing results of the clay capping are included in Appendix E.

3.13 Shoreline Restoration

The shoreline along the equalization basin was restored following installation of the clay up the slope by placing a few inches of topsoil at the top of the slope and reseeding. Geotextile fabric and riprap were placed on the portion of the shoreline that was potentially exposed to erosion from wave action. This restoration will serve to keep the shoreline stable in the long term while natural sediment redeposition occurs after natural river flow is restored.

3.14 Sheet Piling Removal

The 2006 construction season involved removal of all roadways and other infrastructure within the Phase 1 Cell, followed by removal of sheet piling from the river. Sheet piling removal and installation had been done at the end of the 2005 season (continuing until February 2006) to prepare for the 2006 work.

NES mobilized sheet piling removal equipment to the Site in late July and began sheet piling removal in August (some removal of sheet piling that had not been impact driven was done prior to this in 2006 using conventional equipment). A total of 1,395 linear feet of sheet piling were extracted, decontaminated, and salvaged offsite. This did not include approximately 1,480 linear feet that were left in place in the river as that piling would likely be useful as part of a remedy for OU1. A memorandum was developed to evaluate the usefulness of this sheet piling for an OU1 remedy and is included in Appendix F.

3.15 Surveying

NES contracted with a local firm to perform periodic surveys. Two surveys were done during the 2006 construction season. A post-excavation survey was done on July 7 that shows the DNAPL collection trench extension in the equalization basin. Also, a post-capping survey was done on July 24. No pre-excavation survey was done in 2006 because payment for removal of the haul roads and equalization basin was lump sum and not on a per cubic yard basis.

Appendix G includes the survey data obtained during the 2006 season.

3.16 Modification of the Groundwater Collection System

The GCS was designed and constructed to remove contaminated groundwater accumulating in the NAPL collection trench manholes and convey it to the equalization basin for subsequent treatment by the onsite WTP. Construction of the GCS began in July 2005 and was completed in December 2005. It was tested in April 2006 and demonstrated the ability to achieve drawdowns of approximately 12 feet (elevation 707 fmsl) in Manhole 1 and Manhole 2, and 8 feet (elevation 711 fmsl) in Manhole 3.

The original design for the GCS used the equalization basin as the discharge point. This was appropriate at the time the original design was developed (2005), since the expectation at that time was that the remedial activities would extend through the 2008 season; hence, the system would have been installed in 2005 and operating during 2006 and 2007 while work was ongoing in Cell 7, Cell 8, and the Mill Pond Cell. With the Phase 1 Cell being dewatered down to approximately 702 fmsl during the final season (2008), the expectation was that the remedial subcontractor would have to suspend a pump in the manholes to achieve dewatering below 702 fmsl during the season, and the system would be modified for removal of groundwater from the trenches in the interim between completion of the RA and implementation of a remedy for the main plant site, or Operable Unit 1 (OU1). It was not known if the WTP would be operated beyond the OU2 RA, so no definitive final design was developed.

Additional funds became available during 2005 and 2006, enabling Cell 7, Cell 8, and the Mill Pond Cell to be completed in 2005 and the Phase 1 Cell cleanup to occur in 2006. Therefore, the GCS was not used to pump water to the equalization basin for manhole dewatering during the 2006 season, but it was constructed in 2005 to discharge into the equalization basin anyway. This was done because it was necessary to test the system early in the 2006 season, and the only way this was possible was to run the discharge pipe to the equalization basin and test the system before the equalization basin was removed (the discharge pipe was attached to the sheet piling and relatively little effort was involved in the installation, and the entire discharge pipe was reused during the subsequent modification in 2006).

The GCS was modified in 2006 to pump to the process pad. Because the WTP was dismantled, the removed groundwater will be pumped to storage tanks on the pad and then pumped into tanker trucks for subsequent disposal offsite. Modifications to the GCS included installation of a booster pump, rerouting of the discharge line underneath the Site perimeter access road up to the process pad, installation of a new valve box and electric service panel at the process pad, and construction of a perimeter containment berm around a portion of the process pad. These modifications were made in August and September. As-built drawings of the completed GCS will be provided as part of the Remedial Action Report.

3.17 Materials Left in the River

Some of the imported materials used during the RA to construct haul roads remained in the river at the conclusion of the 2006 construction season. All such imported materials left in the river were free of contamination when they were placed in the river and any cross contamination that might have occurred during remedial activities was scraped off.

3.17.1 Sheet Piling

As stated in Section 3.14, Sheet Piling Removal, a total of approximately 1,480 linear feet of sheet piling were left in place in the river because that piling will likely be useful as part of a remedy for OU1 regardless of the remedy selected (refer to the memorandum in Appendix F). The concept is that this sheet piling will either be used as part of a barrier to retain the river during OU1 remedial activities and removed at the conclusion of the work or become part of a permanent containment wall around OU1.

3.17.2 North/South Haul Road

Imported granular fill had been used to build the north/south haul road. The top few feet of the haul road were scraped off and disposed of offsite at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill. The 7-foot-diameter culverts were removed, crushed, and transported offsite for recycling. All sheet piling was extracted, power-washed, and transported offsite for reuse or salvage. Some of the granular fill was then excavated and used to build the new dock west of the former location of Cell 5. However, the majority of the granular fill was left in place, as it was not economical to excavate and transport the material offsite for reuse elsewhere. The height of granular fill left in the river in the footprint of the north/south haul road was typically between 6 and 8 feet.

3.17.3 Backfill of Sheet Pile Walls

During the project, imported clean earthfill was used to backfill all sheet pile walls where sediment excavation had exposed the face of the wall. This was necessary to reduce the chance of sudden boils forming due to the large head differential across the sheet piling. Typically, a berm was created approximately 30 to 40 feet out from the base of the sheet piling and approximately 10 or 12 feet high. This berm was left in place after the cells were allowed to fill with water since reuse of the earthfill would have required costly excavation of the material from a barge after the water level in the cells returned to static river elevation. The top of these berms typically were at or below 712 fmsl, which was below the sediment line before excavation activities began. The earthfill left in place in the impoundment will likely be suitable for aquatic ecosystem recolonization.

Occasionally, sudden boils did develop despite the effort to backfill the sheet piling as the excavation proceeded. When this occurred, large quantities of earthfill were used to create a semicircular berm around the boil, and once the water level had equalized, the entire berm was filled with earthfill. Over the course of the project, there were about eight such boils. The berms were lowered before the Phase 1 Cell was allowed to fill with water at the conclusion of the 2006 remedial activities.

3.18 DNAPL Removal

DNAPL accumulates in both collection trench Manholes 1 and 3. Since its installation, no DNAPL has been observed in Manhole 2. DNAPL accumulating in Manholes 1 and 3 was periodically monitored during 2006. In September, approximately 2,900 gallons of a mixture of DNAPL and groundwater were pumped out of Manholes 1 and 3 into the storage tanks near the respective manholes. Shortly afterwards, this mixture of DNAPL and groundwater was transported by tanker truck to the Romulus, Michigan facility of The Environmental Quality Company for disposal.

It should be noted that DNAPL is removed from the manholes as a mixture of DNAPL and groundwater because it is difficult to identify the point at which all of the DNAPL has been removed and groundwater is being removed during the pumping process. Of the 2,900 gallons of the mixture, an estimated 500 gallons were DNAPL and the remaining 2,400 gallons were groundwater.

4. Performance Standards and Construction Quality Assurance

Performance standards for the RA are based on target cleanup goals indicated in USEPA's Record of Decision (ROD) (USEPA, 1999) for OU2 and applicable and appropriate federal and state laws and regulations. There is one primary standard, which is 5 mg/kg or parts per million (ppm) of total DDT in sediment. Additionally, there are several environmental and construction quality control measures monitored during the RA.

CH2M HILL validated data generated by analytical work on soil/sediment and air samples performed by offsite laboratories in 2006. Appendix H includes data validation summary memoranda for all of the air and soil samples analyzed by offsite laboratories.

4.1 Standard 1—Stabilization, Excavation, and Offsite Disposal of Sediments Containing Greater than 5 mg/kg Total DDT

The ROD established a target cleanup goal of 5 mg/kg of total DDT for contaminated sediment in the river bottom. Confirmation samples were typically collected after contaminated sediment and soil excavation was believed completed in a given area. During the 2006 season, all contaminated sediment was removed from the haul roads and footprint of the equalization basin, but some NAPL-contaminated glacial till was left in place and capped. Therefore, some confirmation samples exhibited results greater than 5 mg/kg.

Figure 4 shows the sampling grid in and around the equalization basin footprint, which was a continuation of the sampling grid used in previous years, with the northwest corner of former Cell 4 as the origin point (A1).

Table 3 provides the confirmation sampling results from the equalization basin. A total of 29 discrete samples were collected and analyzed by the onsite laboratory for 2,4-DDT; 4,4-DDT; 2,4-dichlorodiphenyldichloroethane (2,4-DDD); 4,4-DDD; 2,4-dichlorodiphenyldichloroethylene (2,4-DDE); 4,4-DDE; and PBB. Three of the samples were collected from the shoreline slope at grids L16, L17, and M16—total DDT concentrations were 198, 121.54, and 5,177 mg/kg, respectively. These locations were subsequently covered under the HDPE geomembrane and clay layers as part of the NAPL collection trench extension. The remaining 26 samples were collected from 25 different grids on the excavation floor—grid P23 was sampled twice. Eleven of the 25 grids exhibited total DDT concentrations greater than 5 mg/kg, with a maximum concentration of 157.6 mg/kg in grid O20. All grids that exhibited DDT concentrations greater than 5 mg/kg were subsequently capped with clay.

4.2 PBB and HBB Analyses

All samples were analyzed for PBB in addition to total DDT. Tables 1 through 3 include the results of PBB and HBB analyses in confirmation, exploratory, and stabilized sediment samples. PBB was detected in only one confirmation sample at 6.60 mg/kg, and was not detected in the majority of exploratory and stabilized sediment samples. The maximum concentration of PBB was 220 mg/kg in an exploratory sample from the east/west haul road.

A few onsite laboratory samples and all offsite laboratory samples were analyzed for HBB. The maximum concentration of HBB detected in any sample was 6,200 mg/kg in an exploratory sample from the east/west haul road.

4.3 Perimeter Air Monitoring

4.3.1 Perimeter Air Monitoring Sampling Network

Five air monitoring stations (VL001, VL002, VL003, VL004E, and VL005) were located around the work area perimeter (refer to Figure 5). Locations were selected to maximize coverage of active site activities in multiple wind directions, tempered by property access and power supply availability limitations. Sampling locations VL001 and VL005 were collocated onsite south of the process pad, near the Site fence along North Street, 100 feet east of the Site entrance. VL005 was the duplicate station for VL001. Location VL002 was located east of the Site and immediately south of the public access boat dock. Sampling location VL003 was located north of the Site on private property about 50 feet east of Penny Park. Location VL004E was placed immediately south of the equalization basin (work area) on the former plant site. The meteorological station was located onsite approximately 220 feet west of the CH2M HILL site trailer.

4.3.2 Types of Equipment Used

Each air monitoring station was equipped with two air samplers, which were a high-volume (HI-Vol) air sampler and a flow-controlled Summa-passivated® canister sampler. HI-Vols were used for collecting total suspended particulates (TSP) on a pre-tared glass-fiber media. Summa canisters were used for collecting whole air samples for volatile organic compound (VOC) analysis. The meteorological station was equipped with barometric pressure, temperature, wind speed, and wind direction sensors.

4.3.3 Required Analyses

The Summa-passivated® canister samplers were programmed to collect ambient air over an 8-hour period, and the HI-Vol samplers collected samples over a 24-hour period. Samples were collected and then sent by overnight courier to Air Toxics, Limited (ATL) in Folsom, California, under a controlled chain-of-custody for the analysis of TSP and VOCs. Laboratory analyses were performed in accordance with the project *Sampling and Analysis Plan* (CH2M HILL, 2002b).

The meteorological station was programmed to record barometric pressure, temperature, wind direction, and wind speed at a rate of 10 data points per hour (that is, 1 data point every 6 minutes). Each data point is the mean of the 6-minute time period. The data were routinely downloaded from the meteorological station and transferred to a project database. During times when the meteorological station was not operational, data were downloaded from the internet for the Alma, Michigan, airport at http://www.wunderground.com/US/MI/Alma.html.

4.3.4 Sampling Frequency

The sampling program was initiated with a sampling event consisting of 14 continuous sample days. The initial event was used to assess the predominant wind direction and the presence and concentration of airborne contamination, and establish the sampling frequency for future sampling events. Based on the testing results during the initial event and past history of remedial operations, the frequency of collection of VOC samples was established to be once every 6 days and TSP samples were collected every 3 days. The sampling cycle was sometimes adjusted to accommodate the following: 1) the delivery and availability of the sampling media supplied by the laboratory, 2) the work schedule, and 3) the weather.

4.3.5 Analytical Results

Meteorological Data

Wind direction and speed data were used to generate statistics and wind rose plots for the dates and time ranges corresponding to air monitoring activities. Appendix I includes copies of all wind rose plots. A wind rose depicts the frequency of occurrence of winds in each of 16 direction sectors (north, north-northeast, northeast, etc.), and six wind speed classes for a given location and time period. The percentage frequency of calm winds is also included.

Wind roses were used to depict graphically the dominant transport direction of the winds for an area. The predominant transport direction over the sample collection time period was then used to assign a description of the relative position of the air monitoring station in relationship to the onsite remedial activities. One of three descriptions was assigned to the location of the monitoring station. An upgradient position was assigned to stations located upwind from the onsite remedial activity. A downgradient position was assigned to stations downwind from the onsite remedial activity. A sidegradient position was assigned to stations located on either side perpendicular to the predominant transport direction. No description was assigned if a predominant transport direction could not be determined (for example, calm winds).

Barometric pressure and temperature data from the date corresponding to air monitoring activities were used to calculate a normalized air volume collected by the air sampler. Corrected air volumes reflect data adjusted for ambient temperature and pressure conditions.

Chemical Data

Validated chemical data results from the perimeter air monitoring program are shown in Table 4. For VOC analyses, only compounds that were detected at least once during the sample program are listed. Chemical data quality was evaluated by reviewing the laboratory data packages for precision, accuracy, representativeness, completeness, and comparability using procedures similar to those described in the National Functional Guidelines.

Volatile Organic Analyses

Table 5 provides a summary of the VOC and TSP results from the air sampling done at the Site in 2006, and also includes corresponding Occupational Safety & Health Administration (OSHA) Permissible Exposure Limits (PELs) for each VOC (the OSHA PELs are set to protect workers against the health effects of exposure to hazardous substances and are based on an 8-hour time-weighted average exposure, which coincides with the duration of sample collection during execution of the remedial activities). Trace concentration levels of 17 VOCs were sporadically detected throughout the monitoring program. Ten VOCs had a few detections in the downgradient direction only (1,1,1-trichloroethane, benzene, chloroform, cis-1,2-dichloroethylene, ethylbenzene, m,p-xylene, methyl isobutyl ketone, o-xylene, tetrachloroethylene, and trichloroethylene). Two VOCs were detected in multiple directions, but predominantly in the downgradient direction (chlorobenzene and toluene). Four VOCs were detected in multiple directions with no clear pattern (acetone, carbon disulfide, methyl ethyl ketone, and methylene chloride). Chloromethane had one detection in a side gradient direction. Note that the maximum concentrations of VOCs detected were several orders of magnitude below any corresponding OSHA PEL.

Total Suspended Particulates

Only one TSP result during the 2006 construction season exceeded the National Ambient Air Quality Standards (NAAQS) of 150 micrograms per cubic meter ($\mu g/m^3$). This was a detection of 160 $\mu g/m^3$ from an upgradient station on July 9. Overall, there was no distinctive pattern to TSP results, with average concentrations being 45 $\mu g/m^3$ in the upgradient direction, 39 $\mu g/m^3$ in the sidegradient direction, and 46 $\mu g/m^3$ in the downgradient direction.

4.4 River Turbidity Monitoring

Turbidity levels were monitored in the Pine River during mass dewatering of the Phase 1 Cells and during removal of sheet piling. Turbidity was monitored at two upstream and two downstream locations twice daily during these activities. Readings were recorded in 2-foot intervals from the surface to the river bottom at each location. Figure 6 shows the turbidity monitoring locations. An action level of 6 nephelometric turbidity units (NTUs) above background was established by the *Substantive Requirements Document for the Velsicol Superfund Site*, above which sediment-disturbing activities would be modified or halted to reduce turbidity (MDEQ, 2000).

Table 6 provides the turbidity monitoring results during mass dewatering and sheet pile installation activities. No exceedances of more than 6 NTUs above background were noted; rather, turbidity in the river was dictated by major precipitation events.

5. Quantities

During the 2006 construction season, 52,761.05 tons of stabilized materials were disposed at offsite landfills. A total of 1,770.84 tons of pelletized lime (3.4 percent by weight of stabilized materials) and 12,736.36 tons of backfill were used. Total material removed was estimated to be 28,000 yd^3 based upon the tonnage disposed and an estimated density of 1.9 tons per yd^3. Overall, the average DDT remaining in the subsurface following removal of contaminated materials (excluding sidewall samples) was 22.5 mg/kg; however, the entire vicinity of the equalization basin footprint was capped with clay following excavation of overlying materials.

Based on stabilized sediment sampling results, approximately 23 tons of total DDT were removed from the Site in the material transported to the landfill. Annual project totals for various items are summarized in Table 7.

The total cost of the RA in 2006 was an estimated $4,960,000, or $94 per ton of material disposed of, not including water treatment costs.

6. References

CH2M HILL. 2001. *Year 2000 Cleanup Status Report–Velsicol Chemical Superfund Site.*

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U. S. Environmental Protection Agency (USEPA). 1999. *Record of Decision for Operable Unit 2–Pine River, Velsicol Chemical Superfund Site, St. Louis, Michigan.*

Tables

TABLE 1

Exploratory Sampling Results

Velsicol Chemical Site–2006 Cleanup Status Report

Sample Info.				Concentration in milligrams per kilogram (mg/kg)								
Date	Time	Location/Comments[a]	Sample ID	o,p-DDE	p,p-DDE	o,p-DDT	p,p-DDT	o,p-DDD	p,p-DDD	Total DDT[b]	HBB[c]	PBB[d]
5/10/2006	1530	N/S haul road base, grid G21	1710	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/10/2006	1540	N/S haul road base, grid H21	1709	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/10/2006	1555	N/S haul road base, grid I21	1707	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/10/2006	1610	N/S haul road base, grid J21	1706	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/10/2006	1625	N/S haul road base, grid K21	1711	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/10/2006	1630	N/S haul road base, grid L21	1708	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	NA	<0.55
5/20/2006	1600	E/W haul road, grid N16	1714	140	510	310	1,000	180	83	2,223	900	61
5/20/2006	1615	E/W haul road, grid N17	1715	<0.15 J	<0.15 J	<0.15 J	<0.15 J	<0.15 J	<0.15 J	<0.15	<0.55 J	<0.55 J
5/20/2006	1630	E/W haul road, grid N18	1716	160	590	470	1,500	200	110	3,030	820	40
5/20/2006	1640	E/W haul road, grid N19	1717	110	500	470	1,900	160	120	3,260	310	40
5/20/2006	1700	E/W haul road, grid N20	1718	72	360	150	640	87	58	1,367	6,200	62
5/20/2006	1710	E/W haul road, grid N21	1719	63	290	210	860	120	73	1,616	4,200	88
5/20/2006	1640	E/W haul road, grid N19	1720	90	400	270	1,200	140	80	2,180	670	32
5/20/2006	1700	E/W haul road, grid N20	1721	75	350	250	780	94	64	1,613	700	220
5/22/2006	900	random grab from EQ basin sediment	1722	19	44	51	116	70	43	343	157	<5.0
5/22/2006	905	random grab from EQ basin sediment	1723	13	35	69	110	69	46	342	88	<5.0
5/22/2006	910	random grab from EQ basin sediment	1724	12	31	61	101	68	40	313	75	<5.0
5/22/2006	915	random grab from EQ basin sediment	1725	16	34	42	77	68	40	277	128	<5.0
5/22/2006	920	random grab from EQ basin sediment	1726	12	31	49	86	53	33	264	73	<5.0
5/22/2006	925	random grab from EQ basin sediment	1727	17	45	43	99	70	39	313	117	<5.0
6/2/2006	1745	sidewall southwest corner	1738	29	66	78	99	1,724	3,987	5,983	NA	<2.2
6/6/2006	1600	sand/gravel under EQ basin cleanout road	1752	0.72	1.2	5.7	9.2	4.7	4.6	26	NA	<0.55
6/6/2006	1610	sand/gravel under EQ basin cleanout road	1753	0.22	1.0	22	35	5.8	12	76	NA	<0.55
6/8/2006	830	sediment at east cleanout road	1761	19	15	1.1	6.5	18	3.4	63	NA	<2.2
6/8/2006	840	sediment at east cleanout road	1762	33	32	8.7	19	61	6.7	161	NA	<2.2
6/8/2006	855	sediment at east cleanout road	1763	19	27	196	155	135	74	606	NA	<2.2
6/8/2006	1320	untreated sediment south side of EQ basin	1764	19	42	100	117	284	205	767	NA	<2.2
6/8/2006	1325	untreated sediment south side of EQ basin	1765	4.4	7.4	12	19	36	27	106	NA	<2.2
6/8/2006	1330	untreated sediment south side of EQ basin	1766	11	17	178	158	176	137	678	NA	<2.2
6/11/2006	1550	sediment northeast eq basin	1770	68	214	178	674	86	26	1,246	331	<0.55
6/11/2006	1555	sediment northeast eq basin	1771	16	34	48	70	27	13	208	214	<0.55
6/11/2006	1600	sediment northeast eq basin	1772	8	12	39	34	14	10	117	85	<0.55
6/13/2006	1700	EQ basin sand pile north center - sand 1	1776	<1.5	1.8	10	14	6.4	9.7	42	NA	<5.5
6/13/2006	1700	offsite lab duplicate	05CB18-96	0.22 J	1.8	12 J	15 J	6.3 J	9.6 J	45	43 J	0.074 J
6/13/2006	1705	EQ basin sand pile north center - sand 2	1777	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	NA	<0.55
6/13/2006	1715	till north center	1778	17	27	81	93	38	35	291	NA	<5.5
6/13/2006	1725	till north center	1779	0.33	0.46	2.0	2.3	1.6	1.1	7.8	NA	<0.55
6/14/2006	750	pad grab SE	1780	45	63	42	84	169	98	501	NA	<5.5
6/14/2006	750	offsite lab duplicate	05CB18-84	3.1 J	16	14 J	36 J	27	14 J	110	98 J	0.42 J
6/14/2006	755	pad grab SE middle	1781	26	57	132	164	1,511	3,632	5,522	NA	<55
6/14/2006	755	offsite lab duplicate	05CB18-85	10 J	30 J	31 J	110	1,300	3,800	5,281	6.9 J	0.89 J
6/14/2006	800	pad grab SE center	1782	61	70	101	132	322	195	881	NA	<55
6/14/2006	800	offsite lab duplicate	05CB18-86	6.9 J	36 J	20 J	59 J	60 J	28 J	210	220 J	1.4 J
6/14/2006	805	pad grab S middle	1783	42	57	213	200	140	81	733	NA	<55

TABLE 1

Exploratory Sampling Results

Velsicol Chemical Site–2006 Cleanup Status Report

Sample Info.				Concentration in milligrams per kilogram (mg/kg)								
Date	Time	Location/Comments[a]	Sample ID	o,p-DDE	p,p-DDE	o,p-DDT	p,p-DDT	o,p-DDD	p,p-DDD	Total DDT[b]	HBB[c]	PBB[d]
6/14/2006	805	offsite lab duplicate	05CB18-87	8.0 J	36 J	56 J	110 J	77 J	44 J	331	220 J	0.99 J
6/14/2006	810	pad grab SW	1784	40	58	70	99	87	51	405	NA	<5.5
6/14/2006	810	offsite lab duplicate	05CB18-88	6.5 J	20 J	27 J	57 J	35 J	17 J	163	130 J	0.52 J
6/14/2006	815	pad grab middle E	1785	48	63	35	61	63	25	295	NA	<5.5
6/14/2006	815	offsite lab duplicate	05CB18-89	6.5 J	35 J	31 J	69 J	56 J	34 J	232	160 J	0.58 J
6/14/2006	820	pad grab middle center	1786	41	53	22	57	74	30	277	NA	<5.5
6/14/2006	820	offsite lab duplicate	05CB18-90	2.3 J	12 J	7.7 J	30 J	20	19	91	92 J	0.7 J
6/14/2006	825	pad grab middle center	1787	55	68	156	181	122	57	639	NA	<55
6/14/2006	825	offsite lab duplicate	05CB18-91	<150	13 J	23 J	44 J	26 J	14 J	120	85 J	0.32 J
6/14/2006	830	pad grab middle W	1788	26	44	59	78	114	64	385	NA	<5.5
6/14/2006	830	offsite lab duplicate	05CB18-92	4.6 J	14 J	21 J	49 J	53 J	30 J	172	67 J	0.72 J
6/14/2006	835	pad grab NE	1789	16	27	29	49	123	82	326	NA	<5.5
6/14/2006	835	offsite lab duplicate	05CB18-93	3.6	8.6 J	14 J	55 J	26 J	16 J	123	28 J	<600
6/14/2006	840	pad grab N middle	1790	38	55	76	95	92	47	403	NA	5
6/14/2006	840	offsite lab duplicate	05CB18-94	<140	12 J	18 J	38 J	26 J	17 J	111	92 J	0.73 J
6/14/2006	845	pad grab NW	1791	16	21	18	39	33	14	141	NA	<5.5
6/14/2006	845	offsite lab duplicate	05CB18-95	5.5 J	25 J	79 J	140	44 J	28 J	322	180 J	0.90 J
6/16/2006	1630	E side of sand pile - bottom of EQ basin	05CB19-01	2.8 J	4.2 J	88 J	76 J	15 J	22 J	208	3.4 J	0.023 J
6/25/2006	1130	sed. under E/W haul rd near shoreline (odor)	06CB19-37	8.7 J	45 J	130 J	300 J	420 J	840 J	1,744	92 J	1.4 J
6/25/2006	1135	sed. under E/W haul rd near shoreline (odor)	06CB19-38	5.7 J	26	88 J	290 J	310 J	720 J	1,440	440 J	8.5 J
6/25/2006	1340	sand from NE corner of EQ basin bottom	06CB19-39	<0.23	0.018 J	0.023 J	0.032 J	0.039 J	0.020 J	0.13	0.15 J	<7.7
6/25/2006	1345	sand from SE corner of EQ basin bottom	06CB19-40	<0.23 J	0.013 J	0.017 J	0.064 J	0.035 J	0.024 J	0.15	0.11 J	0.0014 J
6/25/2006	1350	glacial till center of EQ basin	06CB19-41	0.0073 J	0.025 J	0.023 J	0.024 J	0.083 J	0.027 J	0.19	0.064 J	<0.70
7/6/2006	NR	W wall of EQ basin, half way down, grid Q18	1792	1.2	1.2	7.2	26	2.1	3.2	41	NA	32 J
7/6/2006	NR	W wall of EQ basin, half way down, grid P17	1793	1.0 J	1.5 J	9.0 J	34 J	2.0 J	3.5 J	51	NA	59 J

[a]Adjacent shaded rows indicate the second listed sample is an offsite laboratory duplicate sample for QA/QC.

[b]Total DDT is equal to the sum of the six DDE, DDT, and DDD analogues analyzed. Non detect values (<x) were not included in the total.

[c]HBB analyses were typically not performed by the onsite lab, although some results are provided.

[d]PBB values include hexabromobiphenyl concentrations only.

Abbreviations for chemicals: DDE = Dichlorodiphenyldichloroethylene, DDD = Dichlorodiphenyldichloroethane, DDT = Dichlorodiphenyltrichloroethane, HBB = Hexabromobenzene, and PBB = Polybrominated biphenyl

"J" qualified results indicate the reported concentration is estimated.

NR means "not recorded."

NA means "not analyzed."

TABLE 2

Stabilized Sediment Sampling Results

Velsicol Chemical Site–2006 Cleanup Status Report

Sample Info.				Concentration in milligrams per kilogram (mg/kg)								
Date	Time	Sediment Source/Comments[a]	Sample ID	o,p-DDE	p,p-DDE	o,p-DDT	p,p-DDT	o,p-DDD	p,p-DDD	Total DDT[b]	HBB[c]	PBB[d]
5/9/2006	1500	N/S haul road	1713	3.5	4.6	31	73	32	32	176	NA	2.4
5/9/2006	1800	N/S haul road	1712	0.31	0.75	12	13	3.3	3.2	33	NA	<0.55
5/26/2006	1000	EQ basin - east	1728	12	26	150	143	74	50	455	48	<5.0
5/26/2006	1100	EQ basin - east	1729	7.7	16	37	48	44	26	179	32	<5.0
5/26/2006	1500	EQ basin - east	1730	11	24	54	61	81	39	270	33	<5.0
5/27/2006	1200	EQ basin - east	1731	14	27	72	83	130	74	400	47	<5.0
5/27/2006	1600	EQ basin - east	1732	4.9	10	25	32	35	19	126	13	<5.0
5/29/2006	1700	EQ basin - north	1733	3.4	7.1	7.2	14	11	7.5	50	50	0.89
5/29/2006	1300	EQ basin - north	1734	14	27	100	110	150	91	492	42	<5.0
5/29/2006	1800	EQ basin	1735	9.1	20	42	58	57	32	218	40	<5.0
6/1/2006	1300	E/W haul road	1739	32	65	33	155	46	11	342	NA	<2.2
5/30/2006	1100	E/W haul road	1736	36	73	56	129	73	39	406	NA	<2.2
5/30/2006	1500	E/W haul road	1737	33	73	47	131	72	33	389	NA	<2.2
6/1/2006	1500	E/W haul road	1740	102	120	40	68	129	28	487	NA	2.5
6/2/2006	1000	E/W haul road	1741	55	172	179	279	162	55	902	NA	<2.2
6/2/2006	1300	E/W haul road	1742	99	282	103	197	160	32	873	NA	3.8
6/2/2006	1500	E/W haul road	1743	307	678	703	1,061	699	278	3,726	NA	<220
6/2/2006	1700	E/W haul road	1744	3.0	7.5	3.3	15	5.4	2.8	37	NA	<2.2
6/3/2006	1000	E/W haul road	1745	39	59	29	126	143	61	457	NA	<2.2
6/3/2006	1500	E/W haul road	1746	14	37	35	59	25	14	184	NA	<2.2
6/3/2006	1700	E/W haul road	1747	33	103	1,659	1,987	135	221	4,138	NA	<2.2
6/3/2006	1300	E/W haul road	1748	47	129	216	340	142	76	950	NA	2.5
6/5/2006	1300	N/S haul road	1749	<0.15	0.22	0.49	0.75	0.23	0.19	1.9	NA	<0.55
6/5/2006	1500	N/S haul road	1750	0.33	0.69	0.75	1.8	1.0	0.70	5.3	NA	<0.55
6/5/2006	1700	N/S haul road	1751	7.7	24	112	150	18	21	333	NA	<2.2
6/6/2006	1000	EQ basin cleanout road	1757	0.28	0.75	0.46	1.0	0.47	0.25	3.2	NA	<0.55
6/6/2006	1300	EQ basin cleanout road	1758	0.41	0.74	0.83	1.6	1.1	1.0	5.8	NA	<0.55
6/6/2006	1500	EQ basin cleanout road	1759	<0.15	0.17	<0.15	0.29	0.37	0.37	1.2	NA	<0.55
6/6/2006	1700	EQ basin cleanout road	1760	10	11	6.4	24	31	15	98	NA	<2.2
6/7/2006	1300	E/W haul road	1754	143	524	355	494	232	109	1,857	NA	15
6/7/2006	1300	offsite lab duplicate	06CB18-77	11 J	99 J	110 J	350	120 J	54 J	744	180 J	6.5 J
6/7/2006	1500	E/W haul road	1755	52	81	161	345	79	47	765	NA	7.6
6/7/2006	1500	offsite lab duplicate	06CB18-78	5.4 J	52	68	190	62	34	411	140 J	3.7 J
6/7/2006	1700	E/W haul road	1756	164	244	55	286	196	103	1,048	NA	20
6/7/2006	1700	offsite lab duplicate	06CB18-79	11 J	120 J	45 J	220	97 J	55 J	548	160 J	5.1 J
6/9/2006	1000	E/W haul road - upper inorganic	1767	8	23	12	45	13	12	113	2,601	7.0
6/9/2006	1400	E/W haul road - upper inorganic	1768	4	15	10	46	10	13	98	2,321	<0.55
6/9/2006	1700	E/W haul road - lower organic	1769	19	42	189	814	257	550	1,871	NA	<0.55
6/12/2006	1700	EQ basin - north	1773	16	26	38	89	39	16	224	NA	<5.5
6/13/2006	1300	EQ basin - east	1774	1.5	2.0	8.3	14	5.5	5.6	36	NA	<5.5
6/13/2006	1700	EQ basin - east	1775	16	31	25	104	60	77	312	NA	<5.5
6/13/2006	1700	offsite lab duplicate	05CB18-97	3.9 J	20 J	22 J	130	53 J	110 J	339	670 J	2.3 J
6/18/2006	1310	EQ basin - northwest	05CB19-02	3.6 J	12 J	26 J	36 J	25 J	13 J	116	30 J	0.26 J

TABLE 2
Stabilized Sediment Sampling Results
Velsicol Chemical Site–2006 Cleanup Status Report

Sample Info.				Concentration in milligrams per kilogram (mg/kg)								
Date	Time	Sediment Source/Comments[a]	Sample ID	o,p-DDE	p,p-DDE	o,p-DDT	p,p-DDT	o,p-DDD	p,p-DDD	Total DDT[b]	HBB[c]	PBB[d]
6/18/2006	1315	EQ basin - west	05CB19-03	<4.8	0.25 J	0.56 J	1.0 J	0.47 J	0.26 J	2.5	9.4 J	0.096 J
6/18/2006	1320	EQ basin - southwest	05CB19-04	0.13 J	0.42 J	1.1 J	1.2 J	1.3 J	0.76 J	4.9	8.0 J	0.047 J
6/18/2006	1325	EQ basin - south	05CB19-05	<5.5	0.31 J	0.62 J	0.98 J	0.81 J	0.49 J	3.2	3.2 J	0.040 J
6/18/2006	1330	EQ basin - center	05CB19-06	0.17 J	0.61 J	1.6 J	1.7 J	1.8 J	0.90 J	6.8	7.7 J	0.047 J
6/18/2006	1335	EQ basin - north	05CB19-07	9.0 J	17 J	80 J	98 J	120 J	88 J	412	79 J	0.047 J
6/18/2006	1340	EQ basin - northeast	05CB19-08	<4.8	0.28 J	0.59 J	0.91 J	0.83 J	0.55 J	3.2	5.5 J	0.13 J
6/18/2006	1345	EQ basin - southeast	05CB19-09	<0.57	0.027 J	22 J	52 J	0.40 J	1.3	76	0.049 J	<7.5
6/20/2006	910	EQ basin	06CB19-18	4.3 J	19 J	16 J	70 J	28 J	17 J	154	160 J	1.5 J
6/20/2006	915	EQ basin	06CB19-19	4.9 J	12 J	17	32	48 J	20	134	19 J	0.21 J
6/20/2006	920	EQ basin	06CB19-20	<14	1.5 J	0.52 J	3.5 J	2.3 J	1.9 J	9.7	30 J	0.12 J
6/20/2006	925	EQ basin	06CB19-21	1.7 J	3.3 J	1.8 J	3.5 J	13	1.6 J	25	2.7 J	0.051 J
6/20/2006	930	EQ basin	06CB19-22	<14	0.93 J	0.72 J	2.2 J	1.7 J	0.6 J	6.2	0.83 J	0.015 J
6/20/2006	935	EQ basin	06CB19-23	3.4 J	17 J	19 J	37 J	24 J	12 J	112	100 J	0.82 J
6/20/2006	940	EQ basin	06CB19-24	0.20 J	0.71 J	<6.5	0.91 J	1.7 J	0.5 J	4.0	1.7 J	0.012 J
6/22/2006	1530	EQ basin	06CB19-25	7.2 J	30 J	26 J	140	13 J	20 J	236	150 J	0.86 J
6/22/2006	1535	EQ basin	06CB19-26	14 J	42 J	45 J	420 J	220	420 J	1,161	210 J	2.0 J
6/22/2006	1540	EQ basin	06CB19-27	0.14 J	0.71	1.3 J	4.5 J	1.5	1.1	9.3	3.0 J	<9.4
6/22/2006	1545	EQ basin	06CB19-28	0.47 J	2.3	8.2 J	14 J	3.6 J	3.8 J	32	25 J	0.07 J
6/22/2006	1550	EQ basin	06CB19-29	0.24 J	1.4	1.9 J	19	2.4 J	3.7 J	29	2.0 J	0.048 J
6/22/2006	1555	EQ basin	06CB19-30	<140	11 J	320	1,000 J	120 J	140	1,591	140 J	0.41 J
6/23/2006	1020	EQ basin	06CB19-31	0.74 J	3.2 J	120 J	420	77 J	100 J	721	3.5 J	0.091 J
6/23/2006	1025	EQ basin	06CB19-32	0.38 J	1.4	0.98 J	2.5	3.0 J	1.1 J	9.4	1.9 J	0.23 J
6/23/2006	1030	EQ basin	06CB19-33	0.65 J	1.8	3.5	5.0 J	7.1 J	3.4 J	21	1.6 J	0.1 J
6/23/2006	1035	EQ basin	06CB19-34	<1.6	0.15 J	0.5 J	1.7	0.25 J	0.28 J	2.9	0.24 J	<5.3
6/23/2006	1040	EQ basin	06CB19-35	3.1 J	16 J	15 J	47 J	20 J	18 J	119	180 J	1.3 J
6/23/2006	1045	EQ basin	06CB19-36	<100	12 J	27 J	190	5.6 J	7.4 J	242	78 J	0.52 J

[a]Adjacent shaded rows indicate the second listed sample is an offsite laboratory duplicate sample for QA/QC.

[b]Total DDT is equal to the sum of the six DDE, DDT, and DDD analogues. Non detect values (<x) were not included in the total.

[c]HBB analyses were typically not performed by the onsite lab, although some results are provided.

[d]PBB values include hexabromobiphenyl concentrations only.

Abbreviations for chemicals: DDE = Dichlorodiphenyldichloroethylene, DDD = Dichlorodiphenyldichloroethane, and DDT = Dichlorodiphenyltrichloroethane
HBB = Hexabromobenzene, and PBB = Polybrominated biphenyl
NA means "not analyzed."

TABLE 3
Equalization Basin Confirmation Sampling Results
Velsicol Chemical Site–2006 Cleanup Status Report

Sample Info.				Concentration in milligrams per kilogram (mg/kg)							
Date	**Time**	**Location/Comments**	**Sample ID**	**o,p-DDE**	**p,p-DDE**	**o,p-DDT**	**p,p-DDT**	**o,p-DDD**	**p,p-DDD**	**Total DDT[a]**	**PBB[b]**
7/8/2006	NR	Q19	1794	<0.15	0.79	0.53	2.9	0.18	0.35	4.8	<0.55
7/8/2006	NR	Q20	1795	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/8/2006	NR	Q21	1796	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/8/2006	NR	O17	1797	<0.15	<0.15	0.62	1.7	0.85	1.3	4.4	6.6 J
7/8/2006	NR	P18	1798	<60	<60	<60	121	<60	<60	121	<220
7/8/2006	NR	P20	1799	<0.15	0.51	1.7	3.2	0.65	0.98	7.0	<0.55
7/8/2006	NR	R22	1800	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/10/2006	NR	M19	1801	<0.15	<0.15	2.0	2.16	0.16	0.23	4.6	<0.55
7/10/2006	NR	M20	1802	<0.15	0.17	0.24	<0.15	<0.15	<0.15	0.41	<0.55
7/10/2006	NR	N18	1803	<0.15	0.30	5.7	4.5	0.65	1.4	12	<0.55
7/10/2006	NR	N19	1804	<0.15	<0.15	0.28	0.25	<0.15	<0.15	0.53	<0.55
7/10/2006	NR	N20	1805	<0.15	<0.15	0.43	0.62	<0.15	0.17	1.2	<0.55
7/10/2006	NR	O18	1806	0.19	0.61	1.3	3.1	0.84	1.1	7.1	<0.55
7/10/2006	NR	O19	1807	0.17	1.2	21	23	2.2	5.0	52	<0.55
7/10/2006	NR	O20	1808	0.61	3.5	53	71	9.9	20	158	<0.55
7/10/2006	NR	P21	1809	0.27	1.7	34	41	4.0	8.8	89	<0.55
7/11/2006	1530	L16 sidewall (near Hot Spot Cell)	1810	2.8	8.2	14	46	46	81	198	<5.5
7/11/2006	1535	M16 sidewall (near Hot Spot Cell)	1811	<60	<60	1,987	1,460	793	938	5,177	<220
7/11/2006	1540	L17 sidewall (near Hot Spot Cell)	1812	<0.75	2.1	29	27	29	34	122	<2.75
7/17/2006	1025	N22	1813	<0.15	<0.15	1.6	2.7	0.37	0.64	5.4	<0.55
7/17/2006	1030	N23	1814	<0.15	0.27	0.35	0.81	0.29	0.26	2.0	<0.55
7/17/2006	1035	P23	1815	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/17/2006	1040	Q22	1816	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/17/2006	1045	P22	1817	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/17/2006	1050	O21	1818	<0.15	0.38	0.73	1.8	0.38	0.42	3.7	<0.55
7/17/2006	1055	N21	1819	<0.15	0.19	2.3	3.3	0.47	0.79	7.1	<0.55
7/17/2006	1100	P23	1820	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.55
7/17/2006	1105	O22	1821	0.85	1.3	41	25	1.7	3.4	73	<0.55
7/17/2006	1110	O23	1822	0.79 J	1.2 J	1.6 J	2.0 J	2.6 J	1.2 J	9.3	<0.55

[a]Total DDT is equal to the sum of the six DDE, DDT, and DDD analogues analyzed. Non detect values (<x) were not included in the total.

[b]PBB values include hexabromobiphenyl concentrations only.

Abbreviations for chemicals: DDE = Dichlorodiphenyldichloroethylene, DDD = Dichlorodiphenyldichloroethane, DDT = Dichlorodiphenyltrichloroethane, and PBB = Polybrominated biphenyl.

"J" qualified results indicate the reported concentration is estimated.

NR means "not recorded."

TABLE 4
Analytical Results of Perimeter Air Monitoring
Velsicol Chemical Site–2006 Cleanup Status Report

			TSP	TSP - Wind Position (based on 24 hours)[A]	1,1,1-TRICHLOROETHANE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROBENZENE	CHLOROFORM	CHLOROMETHANE	CIS 1,2-DICHLOROETHYLENE	ETHYLBENZENE	M,P-XYLENE (SUM OF ISOMERS)	METHYL ETHYL KETONE (2-BUTANONE)	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	METHYLENE CHLORIDE	O-XYLENE (1,2-DIMETHYLBENZENE)	TETRACHLOROETHYLENE (PCE)	TOLUENE	TRICHLOROETHYLENE
Collected Station	8 am to 5 pm Wind Position	Field Sample ID	TSP ($\mu g/m^3$)		Volatile Organic Compounds (ppb v*)																
10-May-06																					
VL001	Up-gradient	06CB18-01	**37**	Side-gradient	1.1 U	**5.7**	1.1 U	1.1 U	1.1 U	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL002	Side-gradient	06CB18-02	**51**	Up-gradient	0.67 U	**6.1**	0.67 U	0.67 U	0.67 U	0.67 U	**3.8**	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	**1.4**	0.67 U	0.67 U	0.67 U	0.67 U
VL003	Down-gradient	06CB18-03	**36**	Side-gradient	1.1 U	**4.4**	1.1 U	1.1 U	1.1 U	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL004E	Up-gradient	06CB18-04	**35**	Down-gradient	1.1 U	**5.8**	1.1 U	1.1 U	1.1 U	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	**1.1**	1.1 U	**1.7**	1.1 U	1.1 U	1.1 U	1.1 U
VL005[B]	Up-gradient	06CB18-05	**40**	Side-gradient	1.0 U	**4.2**	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11-May-06																					
VL001	Up-gradient	06CB18-07	**12**	Up-gradient	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
VL002	Side-gradient	06CB18-08	**11**	Side-gradient	0.94 U	3.7 U	0.94 U	0.94 U	0.94 U	0.94 U	3.7 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U
VL003	Down-gradient	06CB18-09	**9.4**	Down-gradient	**1.2**	**17**	**3.8**	1.1 U	1.1 U	1.1 U	4.3 U	**1.4**	**4.2**	**14**	**18**	**7.1**	**4.7**	**4.7**	**6.4**	**38**	**5.0**
VL004E	Up-gradient	06CB18-10	**12**	Up-gradient	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U
12-May-06																					
VL001	Up-gradient	06CB18-11	**4.6**	Up-gradient	0.88 U	3.5 U	0.88 U	0.88 U	0.88 U	0.88 U	3.5 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U
VL002	Side-gradient	06CB18-12	**5.6**	Side-gradient	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U
VL003	Down-gradient	06CB18-13	**4.2**	Down-gradient	0.88 U	**3.8**	0.88 U	0.88 U	0.88 U	0.88 U	3.5 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U
VL004E	Up-gradient	06CB18-14	**5.7**	Up-gradient	0.90 U	**4.0**	0.90 U	0.90 U	0.90 U	0.90 U	3.6 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
13-May-06																					
VL001	Side-gradient	06CB18-15	**11**	Side-gradient	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
VL002	Up-gradient	06CB18-16	**12**	Up-gradient	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
VL003	Side-gradient	06CB18-17	**11**	Side-gradient	1.0 U	**8.6**	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL004E	Side-gradient	06CB18-18	**13**	Side-gradient	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
14-May-06																					
VL001	Down-gradient	06CB18-19	**22**	Down-gradient	1.0 U	**13**	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL002	Up-gradient	06CB18-20	**26**	Up-gradient	0.92 U	**8.0**	0.92 U	**1.3**	0.92 U	0.92 U	3.7 U	0.92 U	0.92 U	0.92 U	**1.6**	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U	0.92 U
VL003	Up-gradient	06CB18-21	**22**	Up-gradient	0.67 U	**4.2**	0.67 U	0.67 U	0.67 U	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U
VL004E	Down-gradient	06CB18-22	**20**	Down-gradient	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
15-May-06																					
VL001	Down-gradient	06CB18-23	**24**	Down-gradient	0.94 U	**9.8**	0.94 U	0.94 U	**1.3**	0.94 U	3.7 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	**60**	0.94 U	0.94 U	0.94 U	0.94 U
VL002	Up-gradient	06CB18-24	**28**	Side-gradient	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
VL003	Up-gradient	06CB18-25	**23**	Up-gradient	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
VL004E	Down-gradient	06CB18-26	**20**	Down-gradient	1.1 U	**8.6**	1.1 U	1.1 U	1.1 U	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	**1.5**	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL005	Down-gradient	06CB18-27	**24**	Down-gradient	0.98 U	**10**	0.98 U	0.98 U	**1.4**	0.98 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	**77**	0.98 U	0.98 U	0.98 U	0.98 U
16-May-06	From North																				
VL001	Down-gradient	06CB18-29	**31**	Down-gradient	1.0 U	**11**	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	**1.2**	**5.8**	**1.5**	1.0 U	**3.3**	**2.0**	1.0 U	**3.9**	1.0 U
VL002	Side-gradient	06CB18-30	**34**	Side-gradient	1.0 U	**4.4**	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL003	Up-gradient	06CB18-31	**28**	Up-gradient	0.96 U	**4.0**	0.96 U	0.96 U	0.96 U	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
VL004E	Down-gradient	06CB18-32	**29**	Down-gradient	0.68 U	**6.0**	0.68 U	0.68 U	**1.6**	0.68 U	2.7 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U

TABLE 4
Analytical Results of Perimeter Air Monitoring
Velsicol Chemical Site–2006 Cleanup Status Report

			TSP	TSP - Wind Position (based on 24 hours)[A]	1,1,1-TRICHLOROETHANE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROBENZENE	CHLOROFORM	CHLOROMETHANE	CIS 1,2-DICHLOROETHYLENE	ETHYLBENZENE	M,P-XYLENE (SUM OF ISOMERS)	METHYL ETHYL KETONE (2-BUTANONE)	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	METHYLENE CHLORIDE	O-XYLENE (1,2-DIMETHYLBENZENE)	TETRACHLOROETHYLENE (PCE)	TOLUENE	TRICHLOROETHYLENE
Collected Station	**8 am to 5 pm Wind Position**	**Field Sample ID**	**TSP ($\mu g/m^3$)**		**Volatile Organic Compounds (ppb v*)**																
17-May-06																					
VL001	Up-gradient	06CB18-33	**100**	Up-gradient	0.70 U	**3.1**	0.70 U	0.70 U	0.70 U	0.70 U	2.80 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
VL002	Side-gradient	06CB18-34	**27**	Down-gradient	0.82 U	3.3 U	0.82 U	0.82 U	0.82 U	0.82 U	3.30 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	**1.3**	0.82 U	0.82 U	0.82 U	0.82 U
VL003	Down-gradient	06CB18-35	**23**	Down-gradient	0.94 U	**3.8**	0.94 U	0.94 U	0.94 U	0.94 U	3.70 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U
VL004E	Up-gradient	06CB18-36	**34**	Side-gradient	0.68 U	**8.9**	0.68 U	0.68 U	0.68 U	0.68 U	2.70 U	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	**49**	0.68 U	0.68 U	0.68 U	0.68 U
18-May-06																					
VL001	Up-gradient	06CB18-37	**36**	Up-gradient	0.70 U	**2.8**	0.70 U	0.70 U	0.70 U	0.70 U	2.8 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
VL002	Down-gradient	06CB18-38	**11**	Down-gradient	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL003	Side-gradient	06CB18-39	**10**	Side-gradient	0.72 U	**2.9**	0.72 U	0.72 U	0.72 U	0.72 U	2.9 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U
VL004E	Down-gradient	06CB18-40	**24**	Down-gradient	0.70 U	2.8 U	0.70 U	0.70 U	0.70 U	0.70 U	2.8 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
19-May-06																					
VL001	Down-gradient	06CB18-41	**27**	Down-gradient	2.2 U	8.9 U	2.2 U	2.2 U	2.2 U	2.2 U	8.9 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
VL002	Side-gradient	06CB18-42	**18**	Side-gradient	1.1 U	**5.2**	1.1 U	**3.0**	1.1 U	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**8.4**	1.1 U	1.1 U	1.1 U	1.1 U
VL003	Up-gradient	06CB18-43	**15**	Up-gradient	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL004E	Down-gradient	06CB18-44	**34**	Down-gradient	1.1 U	4.5 U	1.1 U	1.1 U	**1.8**	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
20-May-06																					
VL001	Up-gradient	06CB18-45	**120 J**	Up-gradient	1.1 U	**14**	1.1 U	1.1 U	1.1 U	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	**2.7**	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL002	Down-gradient	06CB18-46	**61**	Down-gradient	1.2 U	**9.3**	1.2 U	1.2 U	1.2 U	1.2 U	4.6 U	1.2 U	1.2 U	1.2 U	**1.2**	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL003	Down-gradient	06CB18-47	**19**	Down-gradient	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL004E	Side-gradient	06CB18-48	**46**	Side-gradient	0.78 U	**5.3**	0.78 U	**8.0**	0.78 U	0.78 U	3.1 U	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	**3.1**	0.78 U	0.78 U	0.78 U	0.78 U
VL005[B]	Up-gradient	06CB18-49	**20**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
21-May-06																					
VL001	Side-gradient	06CB18-51	**34**	Down-gradient	0.67 U	**3.4**	0.67 U	0.67 U	0.67 U	0.67 U	2.7 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U	0.67 U
VL002	Down-gradient	06CB18-52	**17**	Side-gradient	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL003	Side-gradient	06CB18-53	**13**	Up-gradient	0.94 U	**4.7**	0.94 U	0.94 U	0.94 U	0.94 U	3.7 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U	0.94 U
VL004E	Down-gradient	06CB18-54	**56**	Down-gradient	0.72 U	**4.6**	0.72 U	0.72 U	0.72 U	0.72 U	2.9 U	0.72 U	0.72 U	0.72 U	**0.80**	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U
22-May-06																					
VL001	Down-gradient	06CB18-55	**150**	Down-gradient	1.1 U	4.3 U	1.1 U	1.1 U	**1.3**	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL002	Side-gradient	06CB18-56	**27**	Side-gradient	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL003	Up-gradient	06CB18-57	**24**	Up-gradient	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL004E	Down-gradient	06CB18-58	**120**	Down-gradient	0.67 U	**2.9**	**6.2**	0.67 U	**2.8**	0.67 U	2.7 U	0.67 U	**1.8**	**6.4**	0.67 U	0.67 U	0.67 U	**2.3**	0.67 U	**9.6**	0.67 U
23-May-06																					
VL001	Up-gradient	06CB18-59	**82**	Up-gradient	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	**4.9**	0.96 U	0.96 U	0.96 U	0.96 U
VL002	Side-gradient	06CB18-60	**43**	Side-gradient	1.0 U	**4.7**	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**3.2**	1.0 U
VL003	Down-gradient	06CB18-61	**46**	Down-gradient	1.2 U	4.7 U	1.2 U	1.2 U	1.2 U	1.2 U	4.7 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL004E	Up-gradient	06CB18-62	**72**	Up-gradient	1.1 U	**6.4**	1.1 U	1.1 U	1.1 U	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**1.9**	1.1 U	1.1 U	1.1 U	1.1 U

TABLE 4
Analytical Results of Perimeter Air Monitoring
Velsicol Chemical Site–2006 Cleanup Status Report

Collected Station	8 am to 5 pm Wind Position	Field Sample ID	TSP	TSP - Wind Position (based on 24 hours)[A]	1,1,1-TRICHLOROETHANE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROBENZENE	CHLOROFORM	CHLOROMETHANE	CIS 1,2-DICHLOROETHYLENE	ETHYLBENZENE	M,P-XYLENE (SUM OF ISOMERS)	METHYL ETHYL KETONE (2-BUTANONE)	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	METHYLENE CHLORIDE	O-XYLENE (1,2-DIMETHYLBENZENE)	TETRACHLOROETHYLENE (PCE)	TOLUENE	TRICHLOROETHYLENE
			TSP (µg/m³)		Volatile Organic Compounds (ppb v*)																
30-May-06																					
VL001	Up-gradient	06CB18-63	**140**	Up-gradient	1.2 U	**5.3**	1.2 U	1.2 U	1.2 U	1.2 U	5.0 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL002	Side-gradient	06CB18-64	**63**	Side-gradient	1.2 U	5.0 U	1.2 U	1.2 U	**2.2**	1.2 U	5.0 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL003	Down-gradient	06CB18-65	**72**	Down-gradient	1.2 U	4.9 U	1.2 U	1.2 U	**1.9**	1.2 U	4.9 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL004E	Up-gradient	06CB18-66	**49**	Up-gradient	1.2 U	**7.6**	1.2 U	1.2 U	1.2 U	1.2 U	5.0 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	**6.4**	1.2 U	1.2 U	1.2 U	1.2 U
2-Jun-06																					
VL001	N/A	06CB18-67	**49**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL002	N/A	06CB18-68	**39**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL003	N/A	06CB18-69	**24**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL004E	N/A	06CB18-70	**31**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
5-Jun-06																					
VL001	Up-gradient	06CB18-71	**110**	Up-gradient	1.2 U	4.6 U	1.2 U	1.2 U	**11 J**	1.2 U	4.6 U	1.2 U	1.2 U	1.2 U	**2.7 J**	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL002	Down-gradient	06CB18-72	**54**	Down-gradient	1.1 U	4.5 U	1.1 U	1.1 U	**5.3**	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**5.9**	1.1 U
VL003	Down-gradient	06CB18-73	**42**	Down-gradient	1.2 U	4.6 U	1.2 U	**3.5**	1.2 U	1.2 U	4.6 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL004E	Side-gradient	06CB18-74	**95**	Side-gradient	1.1 U	4.3 U	1.1 U	**3.0**	1.1 U	1.1 U	4.3 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**2.6**	1.1 U	1.1 U	1.1 U	1.1 U
VL005[B]	Up-gradient	06CB18-75	**110**	Up-gradient	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
12-Jun-06																					
VL001	Down-gradient	05CB18-80	**62**	Down-gradient	1.1 U	**6.0**	1.1 U	1.1 U	**51**	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**20**	1.1 U	1.1 U	1.1 U	1.1 U
VL002	Up-gradient	05CB18-81	**30**	Up-gradient	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL003	Up-gradient	05CB18-82	**23**	Up-gradient	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	4.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL004E	Down-gradient	05CB18-83	**42**	Down-gradient	1.0 U	4.1 U	**5.5**	1.0 U	**210**	1.0 U	4.1 U	1.0 U	**2.0**	**7.0**	1.0 U	1.0 U	1.0 U	**2.3**	1.0 U	**8.6**	1.0 U
15-Jun-06																					
VL001	N/A	06CB19-10	**82**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL002	N/A	06CB19-11	**66**	Side-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL003	N/A	06CB19-12	**42**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL004E	N/A	06CB19-13	**51**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
19-Jun-06																					
VL001	Up-gradient	06CB19-14	**62**	Down-gradient	1.2 U	**7.6**	1.2 U	1.2 U	1.2 U	1.2 U	4.7 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
VL002	Side-gradient	06CB19-15	**130**	Side-gradient	1.1 U	4.2 U	1.1 U	1.1 U	**31**	1.1 U	4.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL003	Down-gradient	06CB19-16	**42**	Up-gradient	1.1 U	**5.9**	1.1 U	1.1 U	**6.7**	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
VL004E	Down-gradient	06CB19-17	**67**	Down-gradient	1.1 U	**4.4 J**	1.1 U	1.1 U	1.1 U	1.1 U	4.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**7.0**	1.1 U	1.1 U	1.1 U	1.1 U
22-Jun-06																					
VL001	N/A	06CB19-42	**49**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL002	N/A	06CB19-43	**43**	Side-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL003	N/A	06CB19-44	**24**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL004E	N/A	06CB19-45	**46**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ

TABLE 4
Analytical Results of Perimeter Air Monitoring
Velsicol Chemical Site–2006 Cleanup Status Report

Collected Station	8 am to 5 pm Wind Position	Field Sample ID	TSP	TSP - Wind Position (based on 24 hours)[A]	1,1,1-TRICHLOROETHANE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROBENZENE	CHLOROFORM	CHLOROMETHANE	CIS 1,2-DICHLOROETHYLENE	ETHYLBENZENE	M,P-XYLENE (SUM OF ISOMERS)	METHYL ETHYL KETONE (2-BUTANONE)	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	METHYLENE CHLORIDE	O-XYLENE (1,2-DIMETHYLBENZENE)	TETRACHLOROETHYLENE (PCE)	TOLUENE	TRICHLOROETHYLENE
			TSP ($\mu g/m^3$)		Volatile Organic Compounds (ppb v*)																
26-Jun-06																					
VL001	Down-gradient	06CB19-46	**120**	Down-gradient	0.78 U	**17**	0.78 U	0.78 U	**17**	0.78 U	3.1 U	0.78 U	0.78 U	0.78 U	**2.3**	0.78 U	**59**	0.78 U	0.78 U	0.78 U	0.78 U
VL002	Up-gradient	06CB19-47	**25**	Up-gradient	0.96 U	**4.9**	0.96 U	0.96 U	**2.3**	0.96 U	3.8 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U
VL003	Up-gradient	06CB19-48	**23**	Up-gradient	1.0 U	**9.0**	1.0 U	1.0 U	**1.1**	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
VL004E	Down-gradient	06CB19-49	**58**	Down-gradient	0.78 U	**3.3**	**2.4**	0.78 U	**21**	0.78 U	3.1 U	0.78 U	**0.81**	**2.2**	0.78 U	0.78 U	0.78 U	**0.90**	0.78 U	**4.7**	0.78 U
28-Jun-06																					
VL001	N/A	06CB19-50	**50**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL002	N/A	06CB19-51	**38**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL003	N/A	06CB19-52	**34**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL004E	N/A	06CB19-53	**78**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
6-Jul-06																					
VL001	Down-gradient	06CB19-54	**69**	Up-gradient	0.96 U	**4.6**	0.96 U	**2.1**	**26**	0.96 U	3.8 U	0.96 U	0.96 U	NR	0.96 U	0.96 U	**17**	0.96 U	0.96 U	0.96 U	0.96 U
VL002	Up-gradient	06CB19-55	**30**	Side-gradient	0.78 U	3.1 U	0.78 U	0.78 U	0.78 U	0.78 U	3.1 U	0.78 U	0.78 U	NR	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U	0.78 U
VL003	Up-gradient	06CB19-56	**25**	Down-gradient	0.76 U	3.0 U	0.76 U	0.76 U	**1.2**	0.76 U	3.0 U	0.76 U	0.76 U	NR	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U
VL004E	Down-gradient	06CB19-57	**75**	Side-gradient	0.76 U	3.0 U	0.76 U	0.76 U	**61**	**0.96**	3.0 U	0.76 U	0.76 U	NR	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U
9-Jul-06																					
VL001	N/A	06CB19-58	**160**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL002	N/A	06CB19-59	**56**	Side-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL003	N/A	06CB19-60	**94**	Down-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
VL004E	N/A	06CB19-61	**68**	Up-gradient	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
14-Jul-06																					
VL001	Up-gradient	06CB19-62	**37**	Up-gradient	1.1 U	**6.5**	1.1 U	1.1 U	1.1 U	1.1 U	4.3 U	1.1 U	1.1 U	NR	1.1 U	1.1 U	**2.1**	1.1 U	1.1 U	1.1 U	1.1 U
VL002	Up-gradient	06CB19-63	**39**	Side-gradient	0.98 U	**6.3**	0.98 U	0.98 U	0.98 U	0.98 U	3.9 U	0.98 U	0.98 U	NR	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
VL003	Down-gradient	06CB19-64	**30**	Down-gradient	0.72 U	**18**	0.72 U	**0.73**	**1.5**	0.72 U	2.9 U	0.72 U	0.72 U	NR	**1.3**	0.72 U	**0.80**	0.72 U	0.72 U	**0.91**	0.72 U
VL004E	Up-gradient	06CB19-65	**28**	Up-gradient	0.79 U	**25**	0.79 U	**4.6**	0.79 U	0.79 U	3.2 U	0.79 U	0.79 U	NR	**3.1**	0.79 U	**2.8**	0.79 U	0.79 U	0.79 U	0.79 U
VL005[B]	Up-gradient	06CB19-66	**44**	Up-gradient	0.82 U	**6.4**	0.82 U	**4.0 J**	0.82 U	0.82 U	3.3 U	0.82 U	0.82 U	NR	0.82 U	0.82 U	**1.9**	0.82 U	0.82 U	**1.0**	0.82 U

Footnotes:
* ppb v= parts per billion volume
U= Not detected above the associated detection limit.
J= Estimated concentration.
A) TSP samples were collected over 24 hour periods. All other samples were collected just during normal working hours.
B) Location VL005 is co-located with VL001.
C) "NRQ" indicates these analyses were not requested.
D) "NR" indicates these results were not reported by the laboratory.

TABLE 5
Perimeter Air Monitoring VOC and TSP Summary
Velsicol Chemical Site–2006 Cleanup Status Report

		VOC Concentrations given in ppb v[A]																	
		1,1,1-TRICHLOROETHANE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROBENZENE	CHLOROFORM	CHLOROMETHANE	CIS 1,2-DICHLOROETHYLENE	ETHYLBENZENE	M,P-XYLENE (SUM OF ISOMERS)	METHYL ETHYL KETONE (2-BUTANONE)	METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	METHYLENE CHLORIDE	O-XYLENE (1,2-DIMETHYLBENZENE)	TETRACHLOROETHYLENE (PCE)	TOLUENE	TRICHLOROETHYLENE	Total Suspended Particulates (µg/m³)
Up-gradient	**Detections**	0	21	0	3	4	0	0	0	0	0	5	0	8	0	0	1	0	40
36 data points	**Maximum**	0	25	0	4.6	11	0	0	0	0	0	3.1	0	49	0	0	1.0	0	160
(TSP 40 data points)	**Average[B]**	0	4.2	0	0.28	0.43	0	0	0	0	0	0.31	0	2.0	0	0	0.03	0	45
	Std. Dev.[B]	0	5.1	0	1.0	1.9	0	0	0	0	0	0.84	0	8.2	0	0	0.17	0	37
Side-gradient	**Detections**	0	9	0	3	2	0	1	0	0	0	0	0	5	0	0	1	0	26
18 data points	**Maximum**	0	8.6	0	8.0	31	0	3.8	0	0	0	0	0	8.4	0	0	3.2	0	130
(TSP 26 data points)	**Average**	0	2.5	0	0.78	1.8	0	0.21	0	0	0	0	0	0.93	0	0	0.18	0	39
	Std. Dev.	0	2.8	0	2.0	7.3	0	0.90	0	0	0	0	0	2.1	0	0	0.75	0	29
Down-gradient	**Detections**	1	20	4	3	16	1	0	1	5	5	7	1	9	5	1	7	1	42
34 data points	**Maximum**	1.2	18	6.2	3.5	210	0.96	0	1.4	4.2	14	18	7.1	77	4.7	6.4	38	5.0	150
(TSP 42 data points)	**Average**	0.04	4.8	0.5	0.19	12	0.03	0	0.04	0.29	1.1	0.78	0.21	7.3	0.36	0.19	2.1	0.15	46
	Std. Dev.	0.21	5.5	1.6	0.70	38	0.16	0	0.24	0.85	3.1	3.1	1.2	19	1.0	1.10	6.8	0.86	31
OSHA PEL[C]		350,000	1,000,000	1,000	20,000	75,000	50,000	100,000	200,000	100,000	100,000	200,000	100,000	25,000	100,000	100,000	200,000	100,000	N/A[D]

Notes:

A) ppb v= parts per billion volume

B) Averages and standard deviations were calculated by using zero for values when the compound was not detected.

C) OSHA PELs are the maximum 8-hour time weighted average concentrations to which workers are permitted to be exposed. They are included for comparison only.

D) N/A = not applicable; OSHA PEL does not exist for total suspended particulates.

TABLE 6
River Turbidity Monitoring Results
Velsicol Chemical Site–2006 Cleanup Status Report

		Upstream Location 1				Upstream Location 2				Downstream Location 1					Downstream Location 2				
Date	**Time**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**8'-10'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**Bot+1'**
4/8/2006	1500	12	12	12	13	11	12	12	13	11	12	12	12	14	11	12	13	14	14
4/9/2006	730	11	11	12	12	11	12	12	12	11	12	12	13	13	11	11	13	13	13
4/9/2006	1300	11	12	12	12	11	11	12	13	11	12	13	13	13	13	13	13	13	13
4/10/2006	1100	11	11	12	12	11	12	12	12	11	12	13	13	13	11	11	13	13	13
4/10/2006	1600	11	12	13	13	11	12	12	13	11	11	12	13	13	11	12	13	13	12
4/11/2006	1000	12	13	12	14	12	12	14	13	11	12	11	13	12	10	12	12	14	13
4/11/2006	1500	12	12	14	14	13	12	13	13	12	12	13	13	14	11	13	13	12	14
4/12/2006	1000	18	19	19	20	19	19	18	19	18	18	17	19		18	17	19	18	
4/12/2006	1600	19	20	19	20	19	20	20	20	16	17	18	18		16	17	18	18	
4/13/2006	1100	10	11	12	12	11	11	12	13	10	11	11	12	12	11	12	12	12	12
4/13/2006	1600	12	12	13	13	10	11	12	12	11	12	13	13	13	10	11	11	12	12
4/14/2006	1000	11	12	13	13	12	13	13	13	11	12	13	13	13	10	11	12	13	13
4/14/2006	1600	10	11	11	12	10	12	12	12	10	11	12	12	13	11	12	13	13	13
4/15/2006	800	19	20	20	21	18	19	18	20	18	18	19	19	19	17	19	18	19	19
4/16/2006	800	12	13	13	13	11	12	12	13	10	11	12	13	13	11	12	12	13	13
4/16/2006	1700	10	11	12	13	11	12	12	13	12	12	13	13	14	12	13	13	14	13
4/17/2006	900	18	19	19	20	19	20	19	21	17	19	19	20	20	18	19	19	19	19
4/17/2006	1630	17	19	19	20	16	17	19	19	18	19	20	20	20	18	18	19	19	19
4/18/2006	1000	16	16	15	15	16	16	15	15	15	15	16	16	16	13	13	14	15	15
4/18/2006	1600	16	16	15	16	13	14	15	15	14	15	15	16	16	14	14	15	15	15
4/19/2006	1000	23	24	24	25	23	23	24	24	23	24	24	25	24	22	23	24	25	25
4/19/2006	1500	22	23	24	24	22	22	24	25	21	22	24	24	25	21	23	24	24	25
4/20/2006	900	32	32	33	34	31	32	34	34	31	32	33	34	34	33	32	32	34	34
4/20/2006	1600	32	33	33	34	31	32	33	34	31	33	33	34	34	31	32	33	34	34
4/21/2006	900	35	36	37	37	34	35	36	36	35	36	37	36	36	35	35	36	36	36
4/21/2006	1600	36	36	36	37	35	36	36	36	34	35	37	37	37	35	35	36	36	36
4/22/2006	900	36	36	37	37	35	36	37	37	35	36	37	37	37	36	36	37	37	37
4/22/2006	1600	36	36	37	37	35	36	36	37	35	36	36	37	37	34	36	36	36	36
4/23/2006	830	35	35	36	37	34	35	36	37	34	35	36	37	36	33	35	36	37	36
4/24/2006	1000	25	25	26	26	25	25	27	27	23	24	25	25	27	23	24	24	25	27
4/24/2006	1600	25	25	26	26	25	25	27	28	23	24	25	26	26	23	23	24	25	26
4/25/2006	1000	22	23	24	24	21	23	23	24	21	22	23	24	24	20	22	23	24	24
4/25/2006	1500	22	22	23	24	21	22	23	23	21	22	23	23	24	20	21	22	23	24
4/26/2006	1100	23	24	24	25	23	24	23	23	22	22	23	24	24	21	22	22	24	25

TABLE 6
River Turbidity Monitoring Results
Velsicol Chemical Site–2006 Cleanup Status Report

		Upstream Location 1				Upstream Location 2				Downstream Location 1					Downstream Location 2				
Date	**Time**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**8'-10'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**Bot+1'**
4/26/2006	1600	23	24	25	24	21	21	22	24	19	21	21	24	24	20	21	21	22	24
4/27/2006	900	24	22	25	25	25	25	26	26	24	26	26	26	26	26	25	26	26	26
4/27/2006	1600	25	26	26	26	24	25	25	26	24	25	26	26	26	25	26	26	26	26
4/28/2006	900	25	26	26	27	24	25	26	26	25	26	27	27	27	26	26	27	27	27
4/28/2006	1605	26	27	27	27	25	26	26	26	26	26	27	27	27	26	26	27	27	27
4/29/2006	900	23	24	24	25	23	23	23	25	22	23	24	24	25	22	22	23	23	25
4/29/2006	1600	22	23	23	23	21	21	22	24	22	23	24	24	25	21	22	23	24	25
4/30/2006	1000	17	17	18	19	16	17	18	19	17	17	18	19	20	16	17	17	18	20
4/30/2006	1430	17	17	18	19	16	17	20	21	17	18	19	20	21	16	16	18	18	21
5/1/2006	1100	21	22	23	23	20	21	23	24	21	22	22	24	24	20	20	21	24	24
5/1/2006	1700	21	22	23	24	21	21	23	23	20	21	22	23	24	21	22	22	25	25
5/2/2006	1000	21	22	23	24	22	23	23	24	22	22	23	24	25	21	21	22	24	24
5/2/2006	1600	21	22	24	24	20	21	22	24	21	21	23	23	25	20	20	21	23	25
5/3/2006	900	19	18	18	20	19	19	20	20	19	20	21	21	22	19	20	21	21	22
5/3/2006	1600	19	19	20	20	19	20	21	22	20	21	22	23	23	21	22	22	23	23
5/7/2006	900	18	19	18	19	17	18	19	19	18	19	19	19	19	19	18	18	17	17
5/7/2006	1600	17	18	18	18	18	18	19	19	17	18	19	19	19	18	19	19	19	19
5/8/2006	1600	32	33	33	34	32	32	33	34	31	32	32	33	34	31	31	32	33	34
5/10/2006	1000	31	31	32	32	31	32	33	33	31	32	33	34	34	31	32	33	34	34
5/10/2006	1600	31	32	33	34	30	31	32	32	30	31	31	32	33	31	31	31	33	33
5/11/2006	900	50	51	52	52	50	50	52	52	49	51	52	52	52	50	51	52	52	52
5/11/2006	1600	50	51	51	51	49	50	51	51	50	52	52	52	52	50	51	52	52	52
5/14/2006	820	48	49	50	50	48	48	49	49	48	49	49	50	51	47	49	49	50	50
5/14/2006	1800	48	48	50	51	49	50	51	52	49	50	53	53	54	49	50	51	53	54
5/17/2006	900	46	46	47	47	45	46	47	47	45	45	47	48	48	45	45	48	48	48
5/17/2006	1500	46	46	47	48	47	47	48	48	47	48	48	48	48	47	48	48	49	49
5/18/2006	1000	42	43	44	44	42	44	44	44	41	42	43	44	44	41	41	43	43	45
5/18/2006	1500	40	41	42	43	42	43	44	44	41	42	43	44	44	40	41	42	43	44
5/22/2006	1000	25	26	27	28	24	25	25	27	24	24	25	25	26	23	23	25	25	26
5/22/2006	1500	25	26	27	28	25	26	26	28	24	25	27	28	28	24	24	27	28	28
5/30/2006	1000	35	36	36	38	35	36	37	39	35	35	37	39	39	35	36	37	39	39
5/30/2006	1600	35	36	37	37	35	36	36	37	34	35	35	36	37	35	36	37	37	38
5/31/2006	1000	180	182	183	185	181	182	182	185	180	181	183	184	185	181	183	184	185	185
5/31/2006	1600	180	182	183	184	180	181	183	184	182	183	184	185	186	182	183	183	185	186

TABLE 6
River Turbidity Monitoring Results
Velsicol Chemical Site–2006 Cleanup Status Report

		Upstream Location 1				Upstream Location 2				Downstream Location 1					Downstream Location 2				
Date	**Time**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**8'-10'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**Bot+1'**
6/1/2006	1000	130	132	134	135	132	133	134	134	133	134	134	135	135	133	134	134	135	136
6/1/2006	1500	131	131	133	134	132	132	133	134	132	133	133	134	135	132	133	134	134	134
6/6/2006	900	38	39	40	41	38	38	39	40	38	39	40	41	42	38	39	40	40	42
6/7/2006	1000	38	39	40	41	38	39	40	42	37	39	42	43	43	38	39	41	42	42
6/7/2006	1400	37	38	40	41	37	39	40	41	39	40	41	43	44	39	40	41	43	44
6/8/2006	1000	38	39	40	41	38	38	40	41	38	39	40	41	41	39	40	41	42	44
6/10/2006	800	30	31	32	32	28	30	31	32	28	28	30	32	32	28	29	29	31	31
6/10/2006	1500	28	30	31	32	28	29	30	31	30	28	30	30	30	28	28	30	31	31
6/11/2006	900	28	30	31	32	29	30	31	32	28	30	31	32	32	28	29	30	32	32
6/14/2006	1500	35	36	36	37	34	35	36	37	33	34	35	36	36	33	33	35	36	36
6/15/2006	1000	41	43	44	46	41	42	43	46	41	42	44	46	46	41	42	44	45	46
6/15/2006	1500	44	45	45	49	43	44	44	46	43	43	44	44	45	43	44	45	45	46
6/20/2006	1000	31	33	34	36	31	31	33	35	31	32	34	35	36	30	31	32	33	34
6/20/2006	1500	30	31	34	36	31	32	33	36	30	31	33	35	36	31	32	33	35	36
6/21/2006	1000	33	34	34	35	32	33	33	35	32	34	35	35	35	33	33	34	35	35
6/21/2006	1400	33	34	35	36	32	34	35	36	31	32	33	34	35	32	33	34	34	35
6/22/2006	1000	40	41	43	44	40	40	43	44	40	41	42	43	43	41	42	42	43	44
6/22/2006	1500	41	42	43	43	40	41	42	43	40	41	42	43	44	41	42	42	44	45
6/24/2006	1000	41	42	43	44	43	44	44	45	44	44	45	45	45	44	45	45	46	46
6/24/2006	1500	41	43	44	44	42	43	43	44	42	43	44	45	45	42	43	43	44	45
6/25/2006	1000	40	41	41	42	40	41	41	43	40	41	41	42	42	41	42	43	43	44
6/25/2006	1400	40	41	42	44	40	41	42	44	41	42	42	43	44	41	42	42	44	45
6/27/2006	1000	24	25	27	27	24	25	27	28	23	24	24	25	27	23	24	25	27	28
6/27/2006	1500	24	25	26	26	23	23	25	26	24	24	26	26	27	23	23	24	26	26
6/28/2006	1000	24	25	26	26	24	25	26	27	24	24	25	26	27	23	24	25	25	27
6/28/2006	1500	24	24	26	26	24	25	25	26	23	24	25	26	27	24	24	25	26	27
6/29/2006	1000	26	27	28	28	26	27	28	29	26	26	28	29	29	26	26	28	29	29
6/29/2006	1500	26	27	27	28	26	27	27	29	26	27	28	28	29	26	26	27	28	29
7/5/2006	1000	24	24	25	26	24	25	25	25	23	24	25	25	26	24	25	26	26	26
7/5/2006	1500	24	25	26	26	24	25	26	27	23	24	25	26	27	23	23	24	26	27
7/6/2006	1000	23	24	24	25	23	24	24	26	23	24	24	25	25	23	24	24	25	26
7/6/2006	1600	23	24	25	26	23	24	25	25	23	24	26	26	26	22	23	24	24	25
7/10/2006	1000	22	24	26	27	23	24	25	26	23	23	25	26	26	23	24	25	26	27
7/10/2006	1600	22	24	26	26	21	22	23	25	21	22	23	24	24	21	21	22	22	24

TABLE 6
River Turbidity Monitoring Results
Velsicol Chemical Site–2006 Cleanup Status Report

		Upstream Location 1				Upstream Location 2				Downstream Location 1					Downstream Location 2				
Date	**Time**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**8'-10'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**Bot+1'**
7/11/2006	1000	21	23	24	24	20	21	22	24	20	21	21	22	23	20	21	22	23	24
7/11/2006	1500	21	22	24	25	21	22	25	25	21	22	23	24	25	21	22	23	24	25
7/13/2006	1000	26	27	28	28	25	26	27	27	25	26	27	28	28	25	26	27	28	28
7/13/2006	1500	26	27	28	27	26	27	28	28	26	27	28	28	28	26	27	28	28	28
7/14/2006	1000	26	27	27	28	26	27	27	28	26	27	27	28	28	25	26	27	28	28
7/14/2006	1500	26	27	27	27	26	27	28	28	25	26	27	27	28	25	26	27	27	28
7/15/2006	900	37	38	39	39	36	37	38	39	36	37	38	39	40	35	36	37	37	40
7/15/2006	1600	37	38	38	39	37	38	39	39	37	37	38	39	39	36	37	38	39	39
7/20/2006	900	37	38	38	39	36	37	38	38	36	36	37	38	39	36	36	37	38	38
7/20/2006	1515	36	37	38	39	36	37	38	38	36	37	38	39	39	36	36	38	39	39
7/21/2006	1000	32	33	34	35	31	32	33	35	30	31	33	36	36	30	31	33	36	36
7/21/2006	1500	31	32	33	34	30	31	32	34	30	30	31	32	33	31	32	33	34	35
7/23/2006	900	32	33	33	34	31	32	33	34	31	31	31	32	33	31	31	32	33	34
7/23/2006	1400	32	32	33	34	32	32	33	33	31	32	33	34	34	31	32	33	34	34
8/1/2006	800	17	17	18	17	17	17	17	18	19	18	18	17	15	19	19	18	17	18
8/1/2006	1400	17	17	18	18	17	17	19	18	17	19	20	19	19	17	17	18	17	17
8/2/2006	800	18	17	20	17	17	17	19	18	18	18	20	17	20	18	18	17	18	19
8/2/2006	1413	18	18	19	18	17	17	18	18	15	17	17	18	19	16	17	17	17	19
8/3/2006	822	25	25	24	25	24	21	23	21	23	22	22	24	24	23	24	24	24	24
8/3/2006	1600	22	22	24	24	21	21	21	23	20	19	22	23	24	21	22	21	21	23
8/4/2006	713	19	18	17	18	19	19	19	19	22	21	21	20	22	20	19	18	18	18
8/4/2006	1520	17	17	17	18	18	19	17	18	17	17	16	16	17	18	19	19	15	17
8/5/2006	742	21	21	21	21	23	21	20	21	19	19	19	19	18	18	17	18	19	18
8/5/2006	1622	17	17	17	18	19	17	20	20	18	17	19	19	19	19	20	20	19	21
8/6/2006	833	28	27	27	25	27	26	25	25	24	22	22	23	24	23	23	22	22	21
8/7/2006	749	30	29	29	28	29	30	31	27	24	24	24	22	23	23	23	23	24	23
8/7/2006	1528	35	36	35	34	35	35	36	32	29	29	29	27	28	26	25	27	26	26
8/8/2006	800	30	31	32	30	30	30	30	31	27	27	27	28	28	25	25	25	25	25
8/8/2006	1547	27	27	27	27	24	23	23	23	21	21	21	20	20	20	19	19	20	18
8/9/2006	836	24	24	24	24	24	24	23	23	21	21	21	20	21	20	19	19	19	19
8/9/2006	1648	30	28	28	26	25	25	24	23	21	20	19	11	11	20	16	16	12	12
8/10/2006	722	19	19	19	19	17	17	16	16	14	14	14	12	12	13	14	15	15	16
8/10/2006	1530	23	23	23	24	22	23	24	25	19	20	21	21	21	17	16	16	16	16
8/11/2006	816	21	21	21	21	20	19	20	19	18	17	17	17	17	5	6	6	8	5

TABLE 6
River Turbidity Monitoring Results
Velsicol Chemical Site–2006 Cleanup Status Report

		Upstream Location 1				Upstream Location 2				Downstream Location 1					Downstream Location 2				
Date	**Time**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**8'-10'**	**0'-2'**	**2'-4'**	**4'-6'**	**6'-8'**	**Bot+1'**
8/11/2006	1502	19	19	19	18	19	19	19	19	18	17	17	17	17	11	10	10	10	11
8/12/2006	805	21	22	21	21	20	20	20	19	17	17	16	16	17	15	15	15	14	14
8/12/2006	1611	22	22	22	22	21	20	21	22	19	20	19	19	19	17	17	17	17	15
8/15/2006	821	31	30	30	30	30	30	30	30	27	27	26	26	25	24	24	24	24	24
8/15/2006	1511	25	25	25	25	21	22	22	23	19	19	17	15	15	13	12	11	13	12
8/16/2006	813	13	13	13	13	11	12	11	11	9	9	9	9	8	5	5	4	3	4
8/16/2006	1457	17	17	14	17	18	16	16	16	14	14	14	14	14	10	9	9	8	8
8/17/2006	813	21	21	21	22	20	20	19	19	17	17	17	17	17	14	13	14	15	13
8/17/2006	1333	22	22	23	22	22	22	22	21	20	20	18	17	16	18	20	20	20	20
8/18/2006	722	28	27	27	26	23	24	24	24	12	12	12	10	11	6	5	4	4	4
8/18/2006	1453	25	25	25	23	21	22	22	23	16	16	16	14	13	8	6	4	4	3
8/19/2006	733	39	39	39	39	39	39	39	38	24	24	24	23	23	14	13	13	13	15
8/19/2006	1414	38	38	38	41	37	37	36	35	20	19	19	19	19	8	9	12	13	13
8/20/2006	700	37	37	37	41	37	37	39	40	20	19	18	20	21	9	10	11	12	12
8/20/2006	1440	36	36	36	38	37	36	36	38	22	21	21	21	20	16	15	16	16	15
8/21/2006	720	35	35	35	36	34	34	35	35	21	21	21	20	20	17	18	18	18	18
8/21/2006	1530	32	31	32	32	32	31	31	31	19	19	18	18	18	16	15	15	15	14
8/22/2006	730	28	28	27	29	27	26	26	26	18	18	18	17	17	15	14	14	13	12
8/22/2006	1600	31	30	30	29	30	30	29	29	21	20	20	20	19	16	16	16	15	14
8/23/2006	730	26	26	25	25	25	24	24	24	17	17	16	16	16	15	15	14	14	14
8/23/2006	1645	28	29	29	28	27	29	29	29	20	19	19	19	18	18	16	16	15	14

TABLE 7

Remedial Action Quantities to Date

Velsicol Chemical Site–2006 Cleanup Status Report

Year	Sediment Removed (yd^3)	Sub D Materials Disposed (tons)	Sub C Materials Disposed (tons)	Lime Used (tons)	Earthfill Used (tons)	Clay Used (tons)	Approximate DNAPL Removed from Subsurface (gallons)	Approximate DDT Removed (tons)	Cells Remediated
2000	81,831	133,006	0	10,764	16,324	0	0	11	Cell 4 and Cell 1,2,3
2001	104,251	208,123	0	6,317	80,858	0	0	25	Cell 1,2,3 and Hot Spot Cell
2002	72,100	103,111	3,810	4,043	58,946	43,420	3,275	134	Cell 1,2,3, Hot Spot Cell, and Area 3
2003	62,781	109,866	0	4,788	14,536	18,546	350	13	Cell 5
2004	147,803	240,175	0	17,904	44,469	3,335	230	11	Cell 6 and Cell 7
2005	143,209	250,125	0	20,015	47,789	0	0	5	Cell 7, Cell 8, and Mill Pond Cell
2006	28,000[a]	52,761	0	1,771	12,736	9,242	500	23	Equalization Basin and Haul Roads
Totals	**639,975**	**1,097,166**	**3,810**	**65,602**	**275,659**	**74,544**	**4,355**	**222**	

[a]The total of 28,000 yd^3 of sediment was estimated based on 52,497 tons of material disposed and a density of 1.9 tons per yd^3.

Figures

Figure 1. Site Location Map **Scale: 1″=440′**
Velsicol Chemical/Pine River Site in St. Louis, Michigan
OU2 Remedial Action – 2006 Cleanup Status Report **Aerial photo dated October 18, 2005**

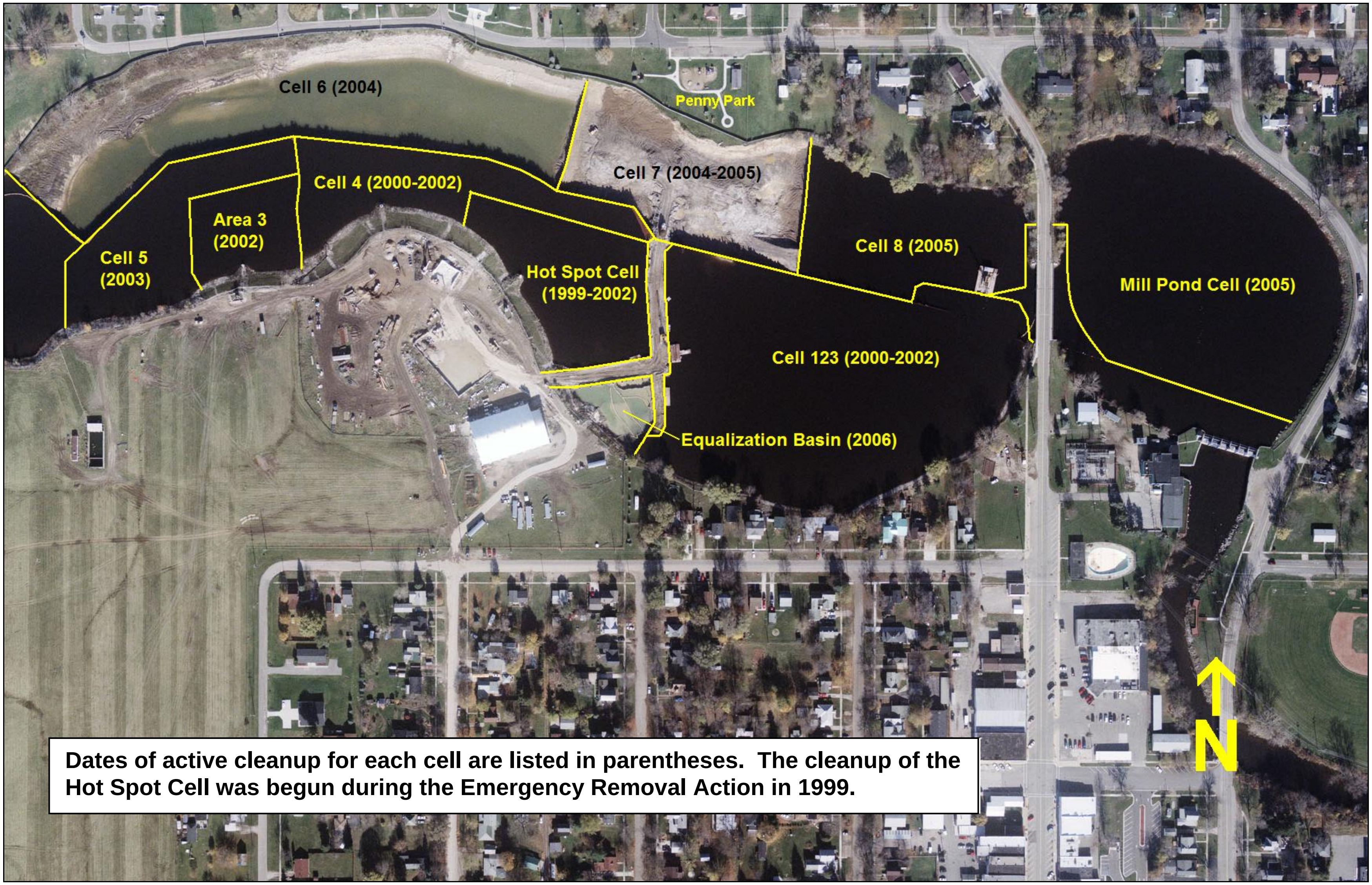

Figure 2. Remedial Cells
Velsicol Chemical/Pine River Site in St. Louis, Michigan
OU2 Remedial Action – 2006 Cleanup Status Report

Scale: 1″=340′

Aerial photo dated November 6, 2004

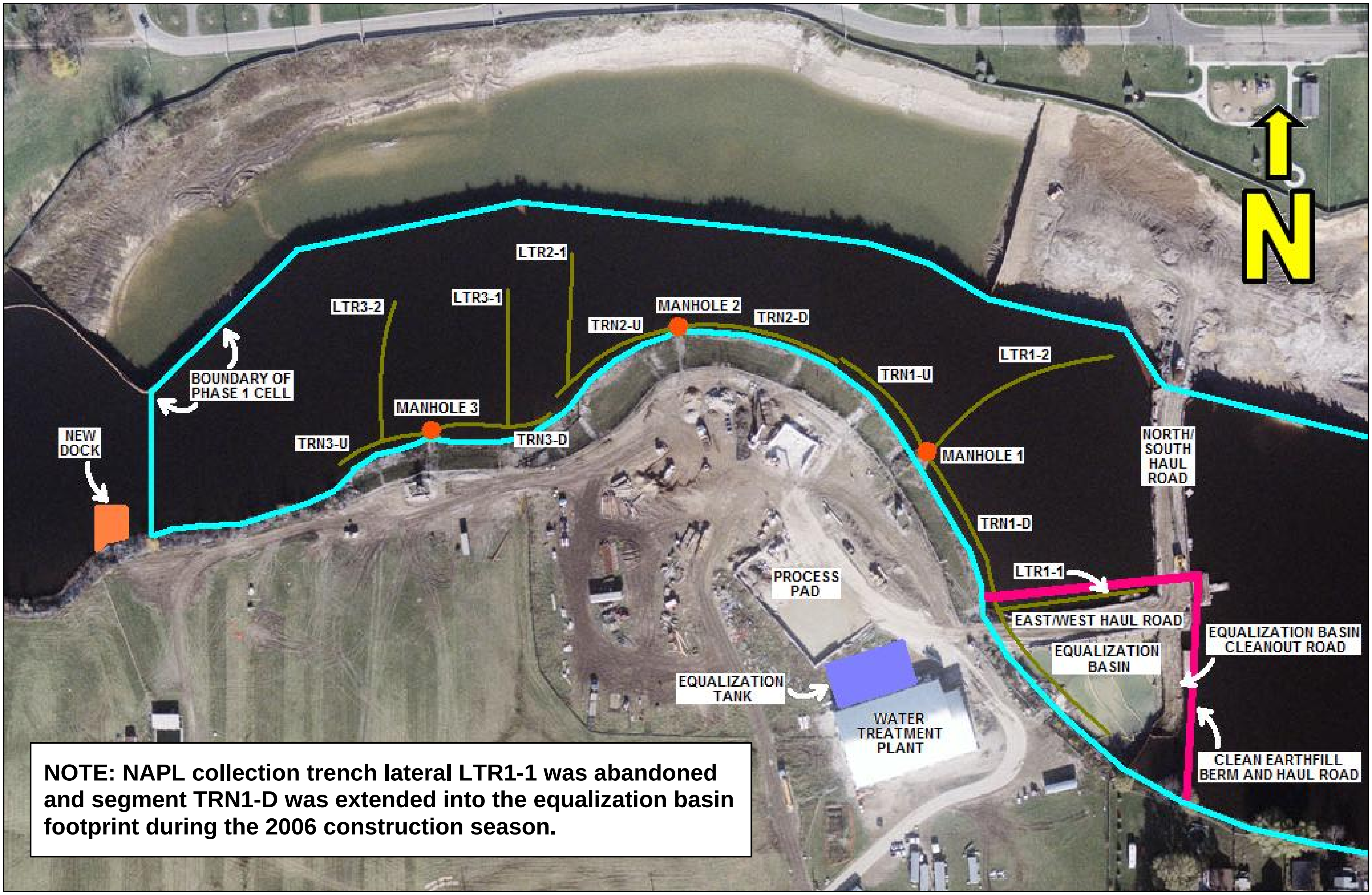

Figure 3. Site Features Related to 2006 Remedial Activities **Scale: 1″=180′**
Velsicol Chemical/Pine River Site in St. Louis, Michigan
OU2 Remedial Action – 2006 Cleanup Status Report **Aerial photo dated November 6, 2004**

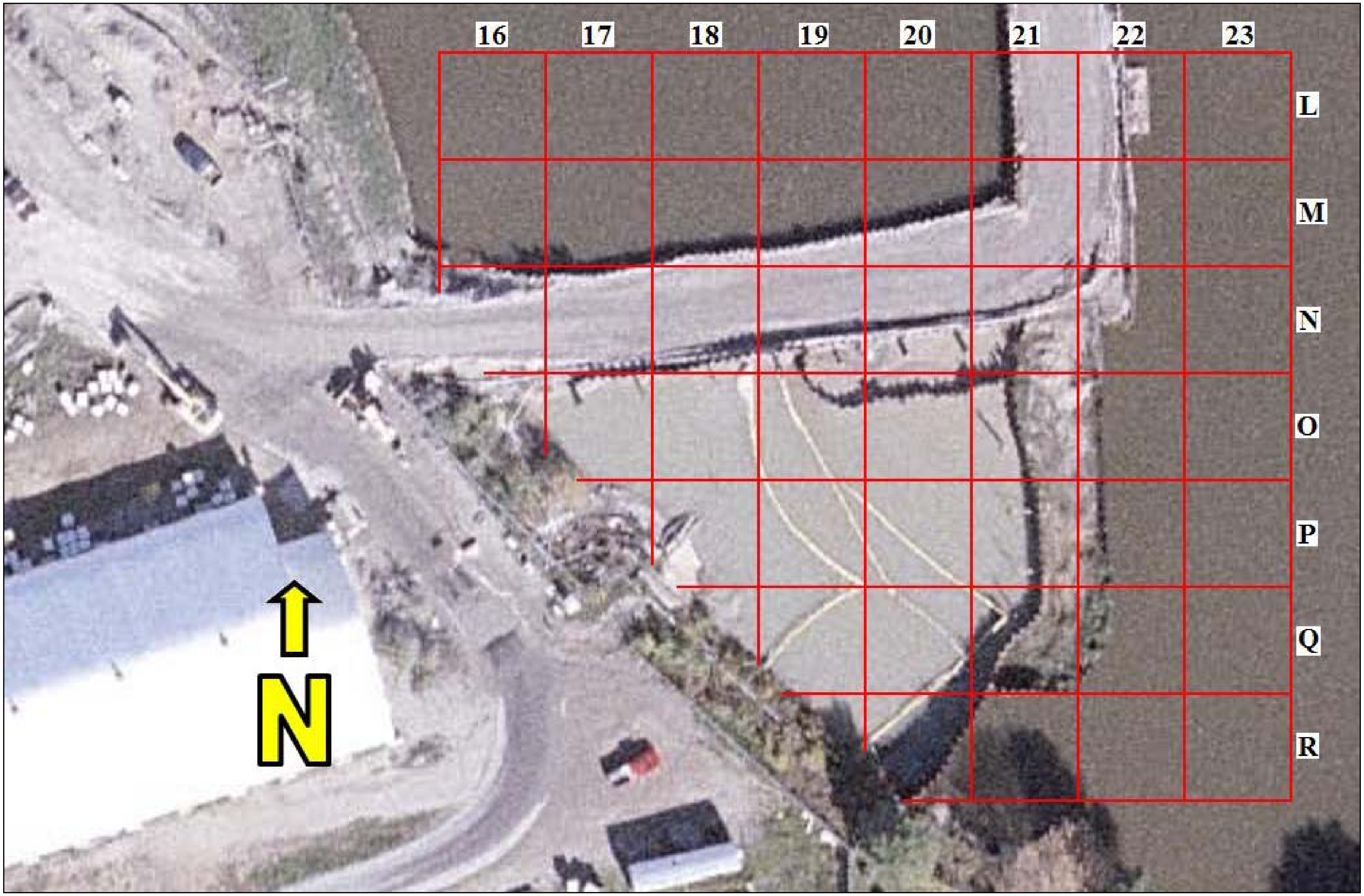

Figure 4. Equalization Basin Confirmatory Sampling Grid **Scale: 1″= 55′**
Velsicol Chemical/Pine River Site in St. Louis, Michigan
OU2 Remedial Action – 2006 Cleanup Status Report **Aerial photo dated October 18, 2005**

Figure 5. 2006 Air Monitoring Locations
Velsicol Chemical/Pine River Site in St. Louis, Michigan
Phase 2 Remedial Action – 2006 Cleanup Status Report

Scale: 1″=290′

Aerial photo dated November 6, 2004

Figure 6. Turbidity Monitoring Locations
Velsicol Chemical/Pine River Site in St. Louis, Michigan
OU2 Remedial Action – 2006 Cleanup Status Report

Scale: 1″=500′

Aerial photo dated October 18, 2005

Appendix A

Photos of 2006 Remedial Activities

PHOTO 1—The location of the former Hot Spot Cell after dewatering in April 2006.

PHOTO 2—The equalization basin in April 2006 prior to its removal.

PHOTO 3—Creation of the berm/haul road around the perimeter of the equalization basin in April 2006.

PHOTO 4—Bulldozer traversing Cell 1, 2, 3 in May 2006; approximately 1 foot of sediment had accumulated during the 2 years that river flow had been restored to the southern half of the river.

PHOTO 5—Removal of the north/south haul road underway in May 2006.

PHOTO 6—Damaged portion of Mill Street and adjoining sidewalk removed in May 2006.

PHOTO 7—Previously damaged sidewalk after replacement in May 2006.

PHOTO 8—Water misters operating downwind of the work area in June 2006.

PHOTO 9—The equalization basin shoreline after backfill and placement of sand in July 2006.

PHOTO 10—The equalization basin shoreline after placement and compaction of clay in July 2006.

PHOTO 11—An open enclosure showing one of the pumps during modification of the GCS in July 2006.

PHOTO 12—The tanker truck that transported the DNAPL and groundwater offsite for disposal in September 2006.

Appendix B
Mill Street Bridge Inspection Reports

CH2M HILL
2127 University Park Drive
Suite 360
Okemos, MI
48202
Tel 517.347.3138
Fax 517.347.3793

June 20, 2006

Robert Stryker, PE
135 South 84th Street, Suite 325
Milwaukee, WI 53214

Subject: Mill Street Bridge Inspection
City of St. Louis, Michigan

Mr. Stryker:

CH2M HILL Michigan, Inc. performed a second inspection of the Mill Street Bridge in St. Louis, Michigan on April 26, 2006. The purpose of the inspection was to document any changes in the condition of the structure compared to conditions noted following the previous inspection performed on July 8, 2005.

Bridge Description and History

The Mill Street Bridge over Pine River is a three-span, simply supported, 174'-0" long by 26'-0" wide prestressed concrete box beam bridge with a bituminous wearing surface built in 1979. Mill Street is a two-lane local road in the vicinity of the bridge. The structure was designed for H20 live loading.

Following the April 13, 2004 inspection, recommendations were to mill and replace the approach asphalt, and to place a bituminous overlay with a waterproofing membrane over the concrete box beams.

From July, 2005 to November, 2005 the bridge was closed to vehicular and pedestrian traffic due to United States Environmental Protection Agency (USEPA) remedial activities in the Mill Pond. A haul road was constructed transversely at the north approach pavement for use by heavy equipment and trucks during remedial activities.

April 26, 2006 Inspection Procedures

At the time of inspection, the bridge was closed to vehicular and pedestrian traffic. This was an 'as needed' closure for the day due to work in the southwest quadrant of the bridge.

CH2M HILL Michigan, Inc. performed a visual inspection of the structure for general condition and typical photographs were taken. Significant structures, facilities, utilities and other features adjacent to the bridge were noted. Due to the high noise level of heavy machinery in the vicinity of the structure, the concrete components could not be sufficiently sounded for delaminations.

The top of the abutments and in-line walls on the east side of the bridge were accessible from the stream bank and were inspected visually. The area to the west of the bridge at the south approach was fenced off to prevent entry into the "exclusion zone" for the USEPA remedial activities. Access to the substructure and underside of the box beams was not feasible due to the high water level under the bridge caused by USEPA remedial activities. As a result, substructure components below the water surface were not inspected.

Inspection Results

Overall, the changes in the bridge condition since the July, 2005 inspection were minimal. The asphalt wearing surface on the deck has more cracking and ruts than the previous inspection, but the minor damage is not substantial enough to change the condition rating of the deck. The open concrete parapet railings remain in fair condition.

The fascia box beams remain in good condition, showing no signs of significant cracking or distress. However, the high water level prevented the completion of a close-up visual inspection of the beams.

The abutments remain in good condition with no major cracks or scaling of the concrete. Notes from the April 13, 2004 inspection indicate a gap between the face of the abutment and the grouted rip rap. This gap was not measured during the July, 2005 inspection, but appeared to be about 1 inch wide during our April 26, 2006 inspection.

The sidewalks and curbs remain in good condition. The sidewalk has settled a couple of inches at the northwest quadrant, most likely due to heavy equipment traveling transverse to the road since the July, 2005 inspection. The sidewalk in the southwest quadrant was covered by dirt at the time of inspection due to construction activities.

Light post bases are present in three of the four quadrants of the bridge; the southwest quadrant does not have a base. The lights were removed by the City of St. Louis prior to the construction activities and will be replaced once those activities are complete.

The expansion joint at pier 1 remains in fair to poor condition, and the expansion joint at pier 2 remains in good condition.

The north and south approach pavements are in poor condition. Most of the deterioration was documented during the July, 2005 inspection. Significant additional deterioration of the north approach was noted during the April 26, 2006 inspection. This has occurred where a haul road was constructed and includes deep ruts which are most likely a direct result of constructing and removing the haul road (Photograph 6). The roadway has settled in this area (Photograph 7). There are several locations where the patched asphalt has failed, resulting in holes through the top course.

Conclusions and Recommendations

The bituminous wearing surface and south approach pavement are heavily cracked and may need to be repaired or replaced once the adjacent USEPA remedial activities are complete. The southwest quadrant will need to be monitored for settlement.

CH2M HILL Michigan, Inc. recommends replacement of approximately 70 feet of the north approach pavement extending from the bridge. Additionally, the curb along the northbound lane should be replaced as it was irreparably damaged during the USEPA activities. Lastly, we recommend leveling or replacing the sidewalk along the west side of the road at the north approach.

Photographs of the bridge and copies of the July, 2005 and April 13, 2004 inspection reports are enclosed. Please call if you have any questions or if you require additional information.

Sincerely,

CH2M HILL Michigan, Inc.

Susan M Watkin, E.I.T.
Bridge Engineer

C. Todd Springer, P.E.
Bridge Manager

LSG/Mill Street Inspection-Final.doc
Enclosures (4)
cc: Scott Roux, PE, Quality Control Reviewer
File

Photograph 1 - Looking South along structure

Photograph 2 - Looking North along structure

Photograph 3 - South Approach

Photograph 4 - North Approach

Photograph 5 - Northeast curb and guardrail removed

Photograph 6 - North approach pavement damage

Photograph 7 - North approach pavement damage

Photograph 8 - Southeast approach shoulder deterioration

OFFICE LOCATIONS
SAGINAW, MI
ST. JOHNS, MI
CARO, MI
DETROIT, MI

Spicer group
ENGINEERS • SURVEYORS • PLANNERS

SAGINAW
230 S. WASHINGTON AVE.
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SAGINAW, MI 48605
(989) 754-4717
(800) 833-0062
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March 15, 2006

Kurt Giles, Utilities Director
City of St. Louis
108 West Saginaw Street
St. Louis, MI 48880-1589

RE: 2006 Bridge Inspection
Mill Street Bridge – Superfund Construction Evaluation
City of St. Louis

Kurt:

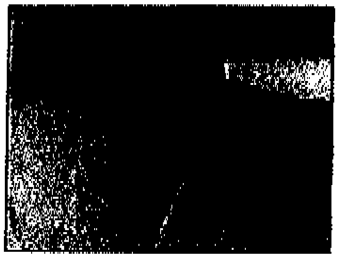
In addition to our standard biannual bridge inventory inspections we were also asked to perform a damage assessment as a result of the superfund construction activities at the north end of the bridge. The main construction activities included driving/vibrating in sheet piling, vibrating removal of the sheets and using the north approach as a haul route crossing.

Below is a brief summary of our observations.

INSPECTION

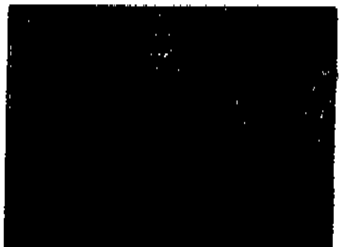
A visual inspection was performed March 14, 2006. The purpose of this inspection was to focus on changes from our previous (2004) inspection and to evaluate potential non-visual impacts as a result of the construction activities. The bridge and approaches are summarized below:

A. Bridge
   - No cracking of the concrete bridge walks along the deck or substructures were observed.
   - The grouted rip-rap has pulled away from the abutment face about 1", however some separation was noted during prior inspections. (See photo)



Looking easterly at north abutment and grouted riprap

B. Approach
   - There is significant settlement of the north roadway approach within 70 feet of the bridge. Most if not all settlement has occurred since the prior inspection.
   - The curb & gutter has settled along with the pavement resulting in inadequate drainage especially along the west side (see photo). The curb & gutter is not only settled along the east side, but also was physically damaged.



Looking south at east curb & gutter

- The sidewalk along the west side has a new crack, which appears to be a result of a concentrated wheel load.

Looking south at west curb & gutter

CONCLUSIONS/RECOMMENDATIONS

Below is a brief summary of our recommendations.

A. Bridge

1. No present cracking was observed at the bridge, therefore no repairs are recommended.
2. We also do not foresee any future cracking as a result of the hammer and vibratory loadings adjacent to it as the substructures are supported on deep-seated piles.

B. Approach

1. The west curb & gutter should be removed, re-aligned and replaced extending approximately 60 feet from the bridge (to the nearest joint).
2. The east curb & gutter should be removed, re-aligned and replaced extending approximately 70 feet from the bridge (to the nearest joint).
3. The sidewalk will need replacing along the re-aligned curb & gutter.
4. The bituminous surface should be removed and replaced to the limits of the new curb & gutter.

If you have any questions related to our inspection and summary, please call me.

Sincerely,

SPICER GROUP, INC.

Mark A. Latsch, P.E.
Sr. Project Manager

Cc: File 111787.06

q:\proj2006\111787_06_projmgt\report_superfund_construction.d
oc

CH2MHILL

CH2M HILL
2127 University Park Drive
Suite 360
Okemos, MI
48202
Tel 517.347.3138
Fax 517.347.3793

July 21, 2005

Robert Stryker, PE
135 South 84th Street, Suite 325
Milwaukee, WI 53214

Subject: Mill Street Bridge Inspection
City of St. Louis, Michigan

Mr. Stryker:

We performed an inspection of the Mill Street Bridge in St. Louis, Michigan on July 8, 2005. The purpose of the inspection is to document the existing condition of the structure.

Bridge Description and History

The Mill Street Bridge over Pine River is a three-span, simply supported, 174′-0″ long by 26′-0″ wide prestressed concrete box beam bridge with a bituminous wearing surface built in 1979. Mill Street is a two-lane local road in the vicinity of the bridge. Sidewalks are present on both sides of the bridge with an open concrete parapet railing, though the sidewalk on the east side of the bridge ends at the north and south abutments. The west sidewalk continues in both directions. The structure was designed for H20 live loading.

Since the construction of the bridge in 1979, no major rehabilitation has been completed. The southwest quadrant had a 'washout' in the Fall of 2001 due to adjacent construction. As a result, the area was backfilled and the sidewalk was reconstructed. The most recent inspection of the bridge was completed on April 13, 2004. The following are the NBI condition ratings for the bridge from the previous inspection:

Deck (SIA-58A)	6
Beams (SIA-59)	7
Abutments (SIA-60)	8
Piers (SIA-60)	6

In the 2004 inspection, the recommendations were to mill and replace the approach asphalt, and to place a bituminous overlay with a waterproofing membrane over the concrete box beams.

July 8, 2005 Inspection Procedures

At the time of inspection the bridge was closed to vehicular and pedestrian traffic due to United States Environmental Protection Agency (USEPA) remedial activities in the Mill Pond. The closure began July 8, 2005 and is expected to end in November, 2005.

The structure was inspected visually for general condition and typical photographs were taken. Significant structures, facilities, utilities and features adjacent to the bridge were noted. Due to the high noise level of heavy machinery and generators in the vicinity of the structure, the concrete components could not be sufficiently sounded for delaminations.

Due to the high water level under the bridge as a result of the remedial activities, access to the substructure and underside of the box beams was limited. A small barge was used for a general visual examination, though a more detailed look was not possible. Substructure components under the surface of the water were not inspected. The top of the abutments and in-line walls on the east side of the bridge were accessible from the slope and inspected visually. The area to the west of the bridge at both approaches was fenced off to prevent entry into the "exclusion zone" for the USEPA remedial activities.

Inspection Results

The deck is in generally good condition. The bituminous wearing surface has several longitudinal cracks that run the full length of the structure as well as extensive mapcracking in all spans. Several holes in the asphalt were noticed allowing for water to leak onto the top of the box beams. The condition rating of '6' is accurate.

Pavement on both the north and south approaches is significantly cracked and deteriorated (Photographs 4 and 3, respectively). In several areas the patched asphalt has failed, resulting in holes through the top course (see Photograph 21). Vegetation has grown up through the cracked joint at the south abutment.

The expansion joint at pier 2 is in good condition (Photograph 6), with some damage at the west curb (see Photograph 25). Pier 1 has an older expansion joint and is in fair to poor condition (see Photograph 8). The concrete in the expansion joint blockouts is cracked and the abutting asphalt is cracked and patched (see Photographs 23 and 24). Full-width cracking was noticed at the north and south abutment and patches in the asphalt are present.

The sidewalks are in good condition, with a few areas of spalling. The sidewalk, slope, and guardrail in the southwest corner were reconstructed in 2001 following the washout. This area will need continual monitoring for settlement, especially if heavy equipment is crossing the bridge regularly. During the washout condition, the water was overtopping the bridge, though no obvious signs of damage were apparent.

The open concrete parapet railing is in good condition. Several of the parapet bases are spalled with exposed reinforcing steel bars (see Photograph 22). The aluminum rail is in generally good condition.

Though a detailed inspection could not be completed due to the high water level, the box beams appear to be in good condition based on the visual inspection (Photographs 11, 14, and 17). At the midspan of span 2, the west fascia beam has an area of cracked and spalled concrete on the fascia (Photograph 28). The condition rating of '7' for the beams is accurate.

The solid concrete piers are in fair condition with light scaling along the sides (Photograph 27). The tops of the piers appear to be level and free from debris. Stains on the concrete indicate water is leaking through the deck and the box beam joints. The condition rating of '6' is accurate for the piers.

The abutments are in good condition with no major cracks or scaling of the concrete. The south abutment shows signs of scour on the west side of the bridge (Photograph 18). The condition is consistent with the rating of '8' from the previous inspection.

A small, rigid conduit runs along the face of both abutments, though the conduit at the south abutment is severed at the west side (Photographs 18 and 19). PVC piping runs under the bridge along the north abutment face for use during the remedial activities (Photograph 10). Light post bases are present in three of the four quadrants of the bridge; the southwest quadrant does not have a base. The light for the northeast corner of the bridge has been removed and will need to be replaced once the remedial activities are complete.

Conclusions and Recommendations

A structural evaluation and load rating will need to be completed before any vehicle exceeding legal highway loading can cross the bridge.

The bituminous wearing surface and approach pavement are heavily cracked and may need to be repaired or replaced once the adjacent USEPA remedial activities are complete. The southwest quadrant will need to be monitored for settlement.

We recommend the bridge be inspected again after the USEPA has completed their work to determine if any damage occurred as a result of the remedial activities.

Enclosed are photographs of the bridge as well as a copy of the April 13, 2004 inspection report. Please call if you need additional information or have questions concerning the inspection.

Sincerely,

CH2M HILL Michigan, Inc.

Susan M Watkin
Bridge Engineer

C. Todd Springer
Bridge Manager

LSG/Mill Street Inspection.doc
Enclosures (2)
c: Steve Miller, PE, Quality Control Reviewer
File

Photograph 1 - Looking South along structure

Photograph 2 - Looking North along structure

Photograph 3 - South Approach

Photograph 4 - North Approach

Photograph 5 - Span 3 deck

Photograph 6 - Expansion Joint at Pier 2

Photograph 7 - Span 2 deck

Photograph 8 - Expansion Joint at Pier 1

Photograph 9 - Span 1 deck

Photograph 10 - Face of North Abutment

Photograph 11 - Interior beam at Span 3

Photograph 12 - North Face of Pier 2

Photograph 13 - South face of Pier 2

Photograph 14 - Beams at Span 2

Photograph 15 - North face of Pier 1

Photograph 16 - South face of Pier 1

Photograph 17 - Beams at Span 1

Photograph 18 - Face of South Abutment (west side)

Photograph 19 - Face of South Abutment (east side)

Photograph 20 - Northeast curb and guardrail removed

Photograph 21 - Southeast approach shoulder deterioration

Photograph 22 - Representative parapet base spalling

Photograph 23 - Asphalt condition at Pier 2 Expansion Joint

Photograph 24 – Asphalt condition at Pier 1 Expansion Joint

Photograph 25 - Pier 2 expansion joint damage

Photograph 26 - Curb spall at southeast corner

Photograph 27 - East face of Pier 2 showing scaling

Photograph 28 - Damage at Span 2, west fascia beam

OFFICE LOCATIONS
SAGINAW, MI
ST. JOHNS, MI
CARO, MI
DETROIT, MI
MARQUETTE, MI

Spicer group
ENGINEERS • SURVEYORS • PLANNERS

SAGINAW
230 S. WASHINGTON AVE.
P.O. BOX 1689
SAGINAW, MI 48605
(989) 754-4717
(800) 833-0062
FAX: (989) 754-4440

April 28, 2004

Dennis W. Collison, City Manager
City of St. Louis
108 West Saginaw Street
St. Louis, MI 48880-1589

RE: Bridge Inventory Inspections, 2004
City of St. Louis, MI

Mr. Collison:

The following structures were inspected on April 13, 2004 in accordance with the Michigan Department of Transportation and FHWA Nation Bridge Inspection Standards:

- B01-00-0200 Michigan Avenue over Horse Creek
- B01-00-0700 Mill Street over Pine River
- B01-00-0800 Main Street over Pine River

Changes made to the structures' condition ratings are summarized below, and discussed in more detail in the MDOT Bridge Inspection Report (BSIR, SIA and Work Recommendation forms).

<u>Michigan Avenue over Horse Creek</u>

The existing structure is a 50'-0" span by 40'-0" wide prestressed concrete box beam bridge built in 1994. The structure is in good overall condition. Minor problems have been noted during previous inspections and there doesn't appear to be any significant changes.

During previous inspections, several random areas of hairline cracking were noted on the concrete railings. Alligator cracking is visible throughout both interior faces of the railings, with vertical hairline cracks visible on the exterior faces. (See photos.) As previously noted, this cracking may have resulted from a chemical reaction within the cement paste and aggregates of the concrete.

A hairline crack was also noted in each abutment. There have been no changes in the condition of the abutments since the 2002 inspection.

Some of the slope protection along the south abutment appears to have slid into the channel exposing the filter fabric below and sediment has deposited along the north abutment. This was noted in the previous inspections and no significant changes are noted. It is unknown as to when this displacement had occurred, but should be monitored during the next inventory inspection. A small amount of approach settlement is also evident along the west approach near the southwest catch basin. (See photo.)

Mill Street over Pine River

The existing structure is a three span, 174'-0" long by 26'-0" wide prestressed concrete box-beam bridge built in 1979. This structure is in relatively good condition. A "washout" occurred at the southwest quadrant in Fall, 2001. This "washout" was caused by adjacent construction. There is minor scour along the southwest quadrant of the structure (See photo.) This area was backfilled and sidewalks reconstructed but should be monitored for settlement.

The approach asphalt pavement is heavily map cracked throughout and is in fair to poor condition. The bituminous bridge surface contains several areas of random longitudinal and transverse cracking in the center of both lanes. These cracks allow water to permeate through to the concrete box beams and leaking in the box beam joints is visible. The box beams are side-by-side, therefore any internal deterioration caused by the leakage is not visible.

Minor spalls were noticed along the southeast sidewalk and northeast curb. Also noticed were several areas where the concrete parapet base pedestals are spalling with exposed rusting reinforcing steel.

The lighting conduit along the south abutment continues to remain severed near the west end of the structure. This was a result of the "washout" that happened in 2001.

Main Street over Pine River

The existing structure is a two span, 100'-0" long by 24'-0" wide composite concrete steel girder bridge built in 1955. The structure is in relatively fair condition, with several areas of deck spalling.

The approach pavement is bituminous and shows significant signs of aging. The surface is heavily map cracked and patched with minor settlement occurring (See photo).

Several patched areas exist throughout the concrete surface, with the bituminous patch breaking up in a few areas. The worst patched areas appear between the expansion joint north to the approach. A chain drag inspection was conducted and identified approximately 18% of the deck surface is spalled or delaminated (See photos). Water is permeating through these patched areas causing rusting of the stringers and bearing areas below (See photo). There are several areas of spalling on the underside of the deck near the deck drains. This has exposed sections of heavily rusting reinforcement (See photo).

In accordance with MDOT's most recent bridge inspection requirements, the Bridge Inspection Report includes the following forms; BSIR (Bridge Safety Inspection Report), SI&A (Structure Inventory and Appraisal), Work Recommendations Form, and Photos.

These forms were filled out electronically using the recently implemented MBIS system. The hard copies of the forms no longer need to be sent to MDOT using this procedure. We have included these forms for your files.

Please refer to the 3rd page of the bridge inspection report for detailed recommendations of repairs to the structures. I have summarized the high priority repair recommendations below for each structure:

Michigan Avenue over Horse Creek

Only minor repairs recommended see report for details.

Mill Street over Pine River

- Mill the existing bituminous approach surface and replace.
- Place a bituminous overlay with a waterproofing membrane over the bridge deck to prevent water from permeating through to box beams below.

Main Street over Pine River

- Mill the existing bituminous approach and resurface.
- Complete a concrete overlay on the bridge surface.
- Replace the expansion joint.
- Zone paint the steel beam ends and bearing areas.

Please call if you require any additional information or would like to discuss specific recommendations for the Main Street Bridge.

Sincerely,

SPICER GROUP, INC.

Richard D. Kathrens, P.E.
Project Manager

cc: Kurt Giles, Utilities Director
Don R. Scherzer, Vice President, SGI
SGI File STLOU0009

Q:\Proj2002\104637.02\Word\Collison01.doc

Facility	Federal Structure ID	Inspector Name	Agency/Consultant	Inspection Date
MILL STREET	294642800007B02	SPICERGROUP	St.Louis/Spicer	04/13/2004

Feature	Latitude	Longitude	Struc Num	Insp Freq	Insp Key
PINE RIVER	."	."	3256	24	GCPI

Location	Length	Width	Year Built	Year Recon	Br Type	Scour Eval	No.Pins
CITY OF ST LOUIS	53.00..	11.10..	1979		5 5	6	

Legend	
9	New
7-8	Good
5-6	Fair
3-4	Poor
2 or Less	Critical

NBI INSPECTION

Item	00	02	04	Comments
1. Surface SIA-58A	6	6	6	Bituminous over the box beams - Several areas of longitudinal and transverse cracking. Leaking through the surface is apparent as noticed on bottom of beams (04) Bituminous - Several areas of longitudinal and transverse cracking. (02) (00)
2. Expansion Jts		6	6	Blockout joint on N- fair, Compression Seal on S - fair. (04) (02) (00)
3. Other Joints		6	4	End Joints, Leaking throughout (04) 1st joints from east and west - (both spans) - show evidence of leaking. (02) (00)
4. Railings		6	6	Several random areas where concrete parapet base have spalled with exposing rusting rebar. (04) Several random areas where concrete parapet base has spalled with exposed re-steel. (02) (00)
5. Sidewalks or curbs		6	7	Concrete Walk - minor hairline cracks (04) (02) (00)
6. Deck SIA-58	8	7	N	Plans show 2-1/2 inches of bituminous over the box-beams. See BIR #1 and BIR #8 for details. (04) Concrete box beam - good condition - monitor leaking of joints. (02) (00)
7. Drainage				(04) (02) (00)
8. Stringer SIA-59	7	7	7	Concrete box beam - good condition - leaking from surface noticed between joints of box-beams. (04) Concrete box beam - good condition - monitor leaking of joints. (02) (00)
9. Paint SIA-59A	N	N	N	(04) (02) (00)
10. Section Loss		N		(04) (02) (00)
11. Bearings		7	7	(04) (02) (00)
12. Abutments SIA-60	8	8	8	Concrete Curtain Wall - Small scour hole located at SW quadrant near steel sheet piling. (04) Concrete curtain walls (02) (00)
13. Piers SIA-60		7	7	(04) Showing evidence of leaking from box beam joints. (02) (00)
14. Slope Protection		7	6	Grouted plain rip-rap. Minor cracking and settlement along south abutment. (04) Grouted rip rap; stabilize slope @ SW quadrant. (02) (00)

Facility	Federal Structure ID	Inspector Name	Agency/Consultant	Inspection Date
MILL STREET	294642800007B02	SPICERGROUP	St.Louis/Spicer	04/13/2004

Feature	Latitude	Longitude	Struc Num	Insp Freq	Insp Key
PINE RIVER	.	.	3256	24	GCPI

Location	Length	Width	Year Built	Year Recon	Br Type	Scour Eval	No.Pins
CITY OF ST LOUIS	53.00..	11.10..	1979		5 5	6	

Legend	
9	New
7-8	Good
5-6	Fair
3-4	Poor
2 or Less	Critical

00 02 04

NBI INSPECTION

15. Approach Pavt		6	4	More than 15% of bituminous surface is map cracked at south end. Minor settlement at both approaches. (04) Bituminous - Random cracking throughout. (02) (00)
16. Approach Shldrs Swalks			7	New Sidewalk at SW. Remaining Sidewalk in good condition with minor deterioration. (04) (02) (00)
17. Approach Slopes				(04) (02) (00)
18. Utilities				(04) (02) (00)
19. Channel SIA-61	6	6	N	Minor Scour located at sw quadrant. (04) (02) (00)
20. Drainage Culverts				Catch Basins located in all 4 quads of the approaches, free from debris. (04) (02) (00)

Guard Rail		Crit Feat Insp(SIA-92)	Freq	Date			General Notes
36A	1				71 Watr Adeq	N	
36B	1	92A Frac Crit			72 Appr Align	8	
36C	1	92B Und. Watr			Temp Supp		
36D	1	92C Spl.Insp			Hi Ld Hit (M)	0	
					Special Insp Equip.	2	

Form 1717A-01/2002

Michigan Department of Transportation
Structure Inventory and Appraisal

MDOT Bridge ID							Control Section
2964284 0000700B02							2964284 0..
NBI Bridge ID	**Struct Num**	**Region**	**TSC**	**County**	**City Resp**	**City Location**	**7- Facility Carried**
294642800007B02	3256	04	4A	29	6428	6428	MILL STREET
6- Feature Intersected	**9- Location**		**Latitude**	**Longitude**	**Owner**		**Maint Resp**
PINE RIVER	CITY OF ST LOUIS		° '	° '	4		4

Bridge History, Type, Materials

27 - Year Built	1979	
106 - Year Reconstructed		
202 - Year Painted		
203 - Year Overlay		
43 - Main Span Bridge Type	5	05
44 - Appr Span Bridge Type		
77 - Steel Type	0	
78 - Paint Type	0	
79 - Rail Type	6	
80 - Post Type	0	
107 - Deck Type	2	
108A - Wearing Surface	6	
108B - Membrane	0	
108C - Deck Protection	0	

Structure Dimensions

34 - Skew	0
35 - Struct Flared	0
45 - Num Main Spans	3
46 - Num Apprs Spans	0
48 - Max Span Length	57.7
49 - Structure Length	173.9
50A - Width Left Curb/SW	4.92
50B - Width Right Curb/SW	4.92
33 - Median	0
51 - Width Curb to Curb	26.0
52 - Width Out to Out	36.42
112 - NBIS Length	Y

Inspection Data

90 - Inspection Date	04/13/2004	
91 - Inspection Freq	24	
92A - Frac Crit Req/Freq	N	
93A - Frac Crit Insp Date		
92B - Und Water Req/Freq	N	
93B - Und Water Insp Date		
92C - Oth Spec Insp Req/F..	N	
93C - Oth Spec Insp Date		
176A - Und Water Insp Met..		
58 - Deck Rating	N	
58A - Deck Surface Rtg	6	
59 - Superstructure Rating	N	
59A - Paint Rating	N	
60 - Substructure Rating	7	
61 - Channel Rating	N	
62 - Culvert Rating	N	

Navigation Data

38 - Navigation Control	0
39 - Vertical Clearance	0
40 - Horizontal Clearance	0
111 - Pier Protection	
116 - Lift Brdg Vert Clear	

Route Carried By Structure(ON Record)

5A - Record Type	1	
5B - Route Signing	5	
5C - Level of Service	6	
5D - Route Number	02033	
5E - Direction Suffix	0	
10L - Best 3m Unclr-Lt	0	0
10R- Best 3m Unclr- Rt	99	99
PR Number		
Control Section	0	
11- Mile Point	0.0	
12- Base Highway Network	0	
13- LRS Route-Subroute		L
19- Detour Length	4	
20- Toll Facility	3	
26- Functional Class	16	
28A - Lanes On	2	
29 - ADT	2700	
30 - Year of ADT	1997	
32- Appr Roadway Width	26.0	
32A/B - Ap Pvt Type/Width	5	26.0
42A- Service Type On	1	
47L - Left Horizontal Clear	0.0	
47R- Right Horizontal Clear	25.9	
53- Min Vert Clr Ov Deck	99	99
100- STRAHNET	0	
102 - Traffic Direct	2	
109 - Truck %	7	
110 - Truck Network	0	
114 - Future ADT	2700	
115 - Year Future ADT	2007	
Freeway	0	

Structure Appraisal

36A- Bridge Railing	1
36B-Rail Transition	1
36C- Approach Rail	1
36D- Rail Termination	1
67- Structure Evaluation	
68- Deck Geometry	
69- Underclearance	
71- Waterway Adequacy	N
72- Approach Alignment	8
103- Temporary Structure	
113- Scour Criticality	6

Miscellaneous

37- Historical Significance	4
98A- Border Bridge State	
98B- Border Bridge %	
101- Parallel Structure	N
EPA ID	
Stay in Place Forms	

Route Under Structure(UNDER Record)

5A - Record Type		
5B - Route Signing		
5C - Level of Service		
5D - Route Number		
5E - Direction Suffix		
10L - Best 3m Unclr-Lt		
10R- Best 3m Unclr- Rt		
PR Number		
Control Section		
11- Mile Point		
12- Base Highway Network		
13- LRS Route-Subroute		
19- Detour Length		
20- Toll Facility		
26- Functional Class		
28A - Lanes Under		
29 - ADT		
30 - Year of ADT		
42B- Service Type Under		
47L - Left Horizontal Clear		
47R- Right Horizontal Clear		
54A - Left Feature	N	
54B- Left Underclearance	99	99
54C- Right Feature	N	
54D- Right Underclearance	99	99
Under Clearance Year		
55A - Reference Feature	N	
55B- Right Horiz Clearance	327.8	
56- Left Horiz Clearance	0	
100- STRAHNET		
102 - Traffic Direct		
109 - Truck %		
110 - Truck Network		
114 - Future ADT		
115 - Year Future ADT		
Freeway		

Proposed Improvments

75 - Type of Work	
76- Length of Improvement	
94- Bridge Cost	
95- Roadway Cost	
96- Total Cost	
97- Year of Cost Estimate	

Load Rating and Posting

31- Design Load	6	
41- Open, Posted, Closed	A	
63- Oper Rtg Method	2	
64F- Fed Rtg Method	32.7	
64M- Mich Oper Rtg	9	139
65- Inv Rtg Method	2	
66- Inventory Load	32.7	
70- Posting	5	
141- Posted Loading		
195- Analysis ID		
193- Overload Class		

Facility	Federal Structure ID	Inspector Name	Agency/Consultant	Inspection Date
MILL STREET	294642800007B02	SPICERGROUP	St.Louis/Spicer	04/13/2004

Feature	Latitude	Longitude	Struc Num	Insp Freq	Insp Key
PINE RIVER	' "	' "	3256	24	

Location	Length	Width	Year Built	Year Recon	Br Type	Scour Eval	No.Pins
CITY OF ST LOUIS	53.00..	11.10..	1979		5 5	6	

PONTIS BRIDGE INSPECTION

English Units

Element Number	Element Name	Total Quant	State 1 Old	State 1 New	State 2 Old	State 2 New	State 3 Old	State 3 New	State 4 Old	State 4 New	State 5 Old	State 5 New

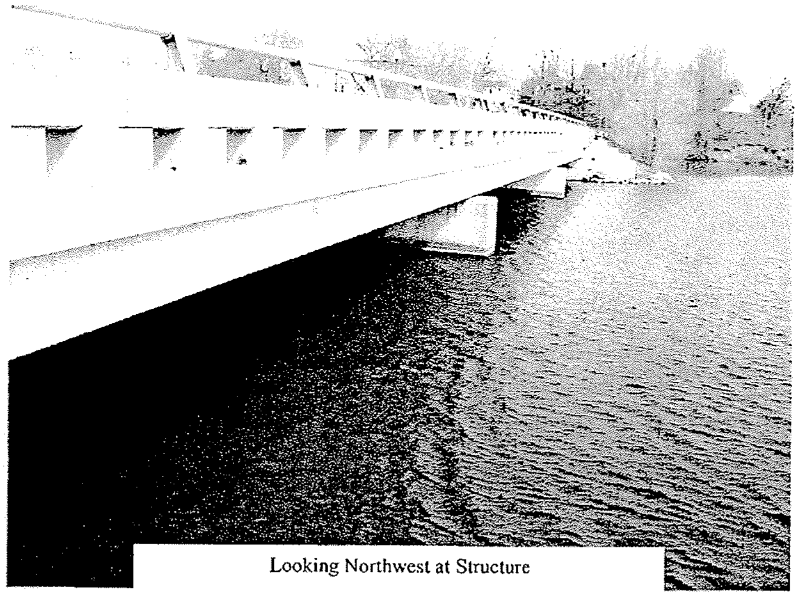
CREW RECOMMENDATIONS

Deck Patching		
Approach Pavement	H	Re-surface approach pavement
Joint Repair	-	-
Railing Repair		
Detailed Insp		
Zone Paint		
Substr. Repair	M	Fill small scour hole at SW quadrant with rip-rap.
Slope Repair		
Brush Cut		
Other Crew Work		

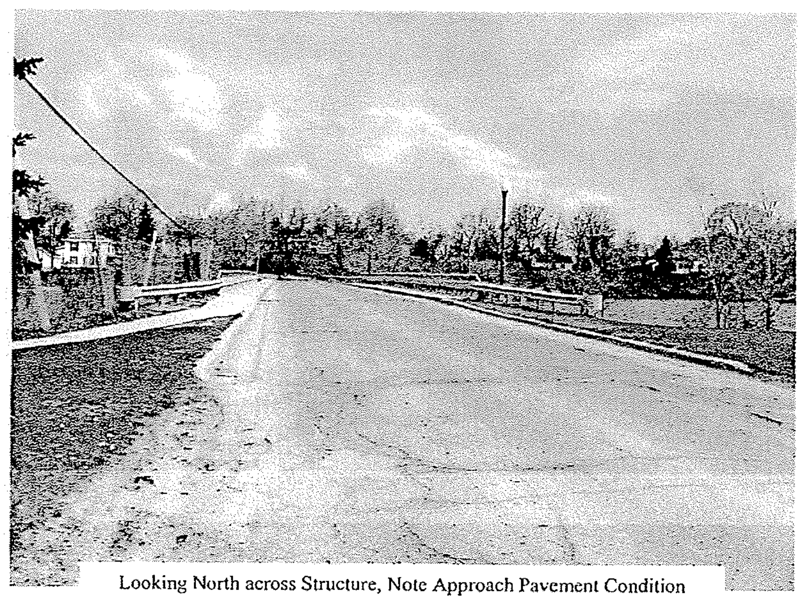
CONTRACT RECOMMENDATIONS

Bridge Replacement		
Superstructure Replacement		
Deck Replacement		
Overlay	H	Re-Surface Bridge
Widen		
Paint		
Zone Paint		
Pin and Hanger		
Substructure Repair		
Other Contract Work		

Bridge Inspection Photos
MILL STREET over PINE RIVER
Bridge No. B01-00-0700
City of St. Louis
March 13, 2004



Looking Northwest at Structure

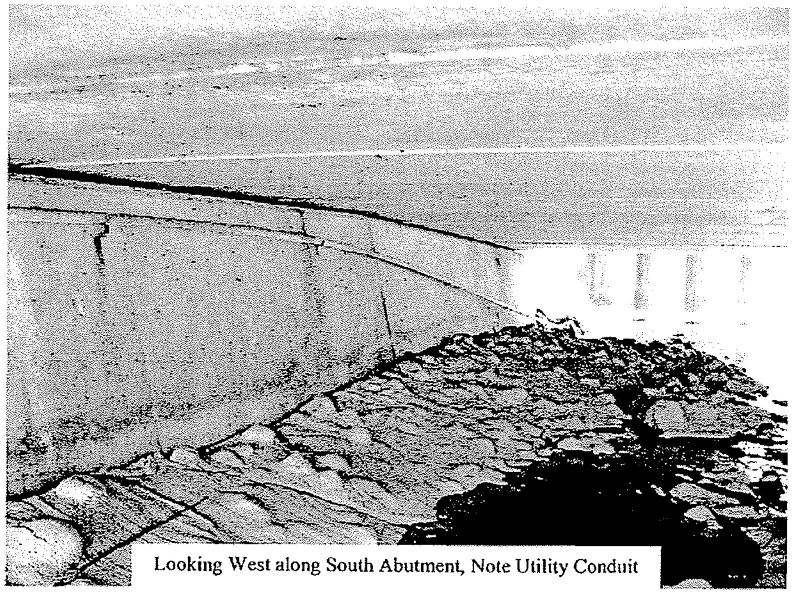


Looking North across Structure, Note Approach Pavement Condition

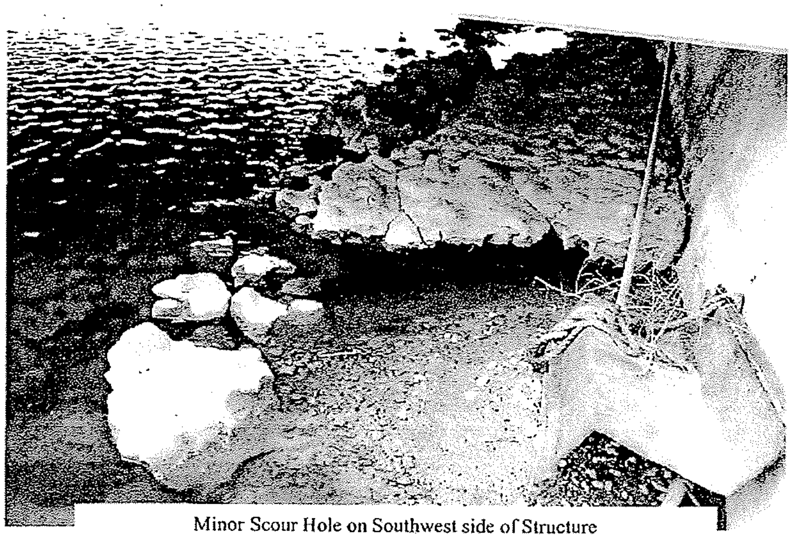
FOR: City of St. Louis
108 West Saginaw Street
St. Louis, MI 48880

BY: Spicer Group
230 S. Washington Ave.
Saginaw, MI 48605

Bridge Inspection Photos
MILL STREET over PINE RIVER
Bridge No. B01-00-0700
City of St. Louis
March 13, 2004

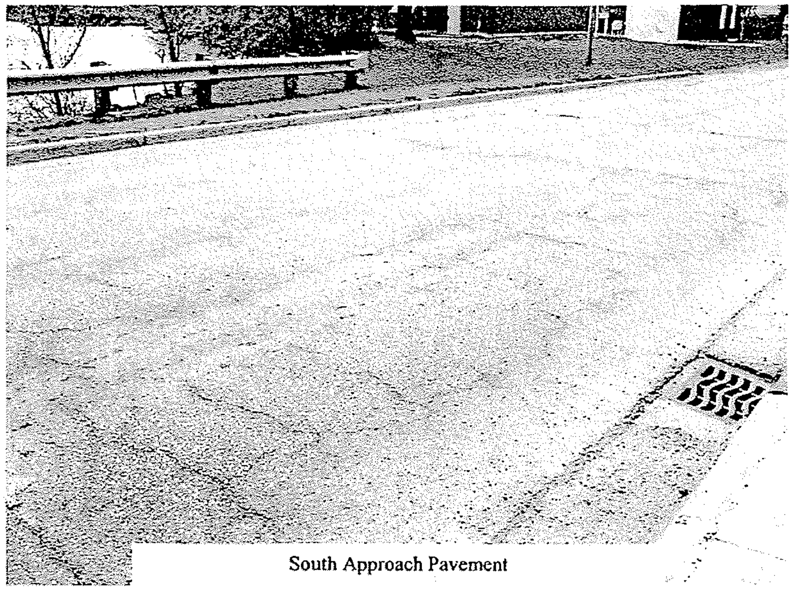


Looking West along South Abutment, Note Utility Conduit



Minor Scour Hole on Southwest side of Structure

Bridge Inspection Photos
MILL STREET over PINE RIVER
Bridge No. B01-00-0700
City of St. Louis
March 13, 2004



South Approach Pavement

Appendix C
2006 Laboratory Result Comparison Memorandum

M E M O R A N D U M CH2MHILL

2006 Laboratory Result Comparison

TO: Rebecca Frey/USEPA, Region 5

COPIES: Regina Bayer/CH2M HILL
Robert Stryker/CH2M HILL

FROM: Carolyn Fehn/CH2M HILL
Heather Hodach/CH2M HILL

DATE: September 11, 2006

Background

Sediment sampling was conducted at the Velsicol Chemical Superfund Site in St. Louis, Michigan from May 9 through July 17, 2006. This sampling included exploratory sampling, stabilized sediment sampling, and confirmation sampling. The majority of the samples were submitted to the onsite laboratory, while a portion (approximately twenty percent) of the samples were analyzed by the offsite laboratory, exclusive of split samples for quality assurance/quality control (QA/QC). All samples were analyzed for the six isomers of DDD, DDE, and DDT, which added together comprised total DDT.

Split samples were collected at a frequency of approximately 10 percent. The purpose of the split samples was to monitor the accuracy of analytical results reported by the onsite lab. PEL Labs of Tampa, Florida was utilized as the offsite lab during the 2006 season. When applicable, the relative percent difference (RPD) between the onsite and offsite laboratories' results for each of the six individual isomers of DDT and Total DDT were calculated using the following equation:

$$RPD = |x_1 - x_2| / [(x_1 + x_2)/2] \times 100$$

x_1 = concentration of analyte analyzed by PEL Laboratories

x_2 = concentration of analyte analyzed by the onsite lab

2006 Sampling Event

A total of 17 field confirmation samples were collected for both the onsite and offsite laboratories. Field duplicates monitored the accuracy and precision of the field sampling process, including sample homogenization and the extraction and analytical methodologies of the labs.

Table 1 lists the analytical results of total DDT for the onsite and offsite laboratory confirmation samples and the calculated RPDs . An RPD was not calculated if the onsite or offsite laboratory result was a nondetect because the RPD value would not determine the actual level of precision. Table 2 lists the analytical results of the individual isomers that comprise total DDT for the onsite and offsite laboratory confirmation samples as well as the RPDs for the individual isomers.

Of the 17 field duplicates analyzed, 13 exhibited calculated RPD values for total DDT that fell outside the QA/QC acceptable limits of ± 30 and 4 RPD values for total DDT that were within the QA/QC limits. CH2M HILL validated the offsite laboratory's analytical results and concluded they were acceptable as reported and as qualified. However, CH2M HILL has not reviewed the onsite lab QC results and cannot confirm if any bias may have occurred in the onsite laboratory analytical results.

The variances between the onsite and offsite labs could be a result of several factors including lack of sample homogeneity (common in solid samples), matrix interference and laboratory detection limits. The heterogeneous nature of the sediment matrix itself allows for target analyte concentration fluctuations throughout a sample resulting in possible variances in analyte concentrations between sample aliquots. In addition, when a sample is split, this heterogeneity is magnified leading to a possible high RPD.

Conclusion

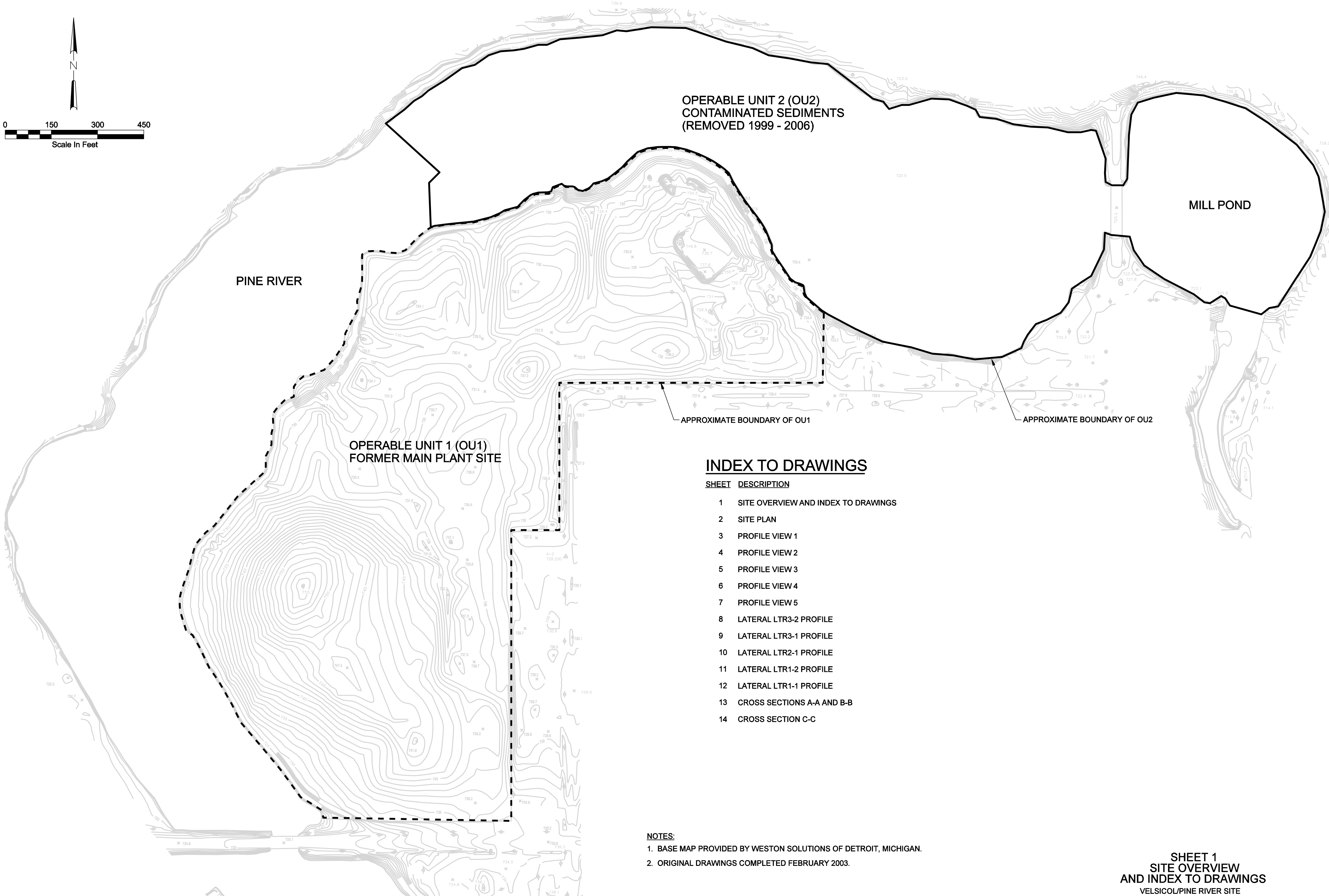
In cases where both labs provided result for total DDT greater than the onsite lab reporting limit (this was the case for all 17 split samples), the onsite lab reported higher results than the offsite lab for 14 of the 17 samples. This variance leads to the conclusion that the offsite laboratory results may contain a minor low bias, the onsite results may contain a high bias, or both of these may be true. CH2M HILL has validated the offsite laboratory analytical results and concluded that the results are acceptable as reported and as qualified. However, additional onsite lab QC results and documentation is needed to further assess if the possibility of a minor positive bias in the onsite analytical results.

TABLE 1
Field Duplicate QA/QC Results Total DDT
Velsicol Chemical Site–2006 Laboratory Result Comparison Memorandum

Offsite Sample Identification	Onsite Sample Identification	Onsite Native Sample – Total DDT (ppm)	Offsite Field Duplicate – Total DDT (ppm)	% RPD
06CB18-77	1754	1857	744	86
06CB18-78	1755	765	411	60
06CB18-79	1756	1048	548	63
06CB18-84	1780	501	110	128
06CB18-85	1781	5522	5281	4
06CB18-86	1782	881	210	123
06CB18-87	1783	733	331	76
06CB18-88	1784	405	160	87
06CB18-89	1785	295	232	24
06CB18-90	1786	277	91	101
06CB18-91	1787	639	120	137
06CB18-92	1788	385	172	77
06CB18-93	1789	326	123	90
06CB18-94	1790	403	111	114
06CB18-95	1791	141	322	78
06CB18-96	1776	42	45	7
06CB18-97	1775	312	339	8

Appendix D

Updated NAPL Collection Trench Record Drawings



INDEX TO DRAWINGS

SHEET	DESCRIPTION
1	SITE OVERVIEW AND INDEX TO DRAWINGS
2	SITE PLAN
3	PROFILE VIEW 1
4	PROFILE VIEW 2
5	PROFILE VIEW 3
6	PROFILE VIEW 4
7	PROFILE VIEW 5
8	LATERAL LTR3-2 PROFILE
9	LATERAL LTR3-1 PROFILE
10	LATERAL LTR2-1 PROFILE
11	LATERAL LTR1-2 PROFILE
12	LATERAL LTR1-1 PROFILE
13	CROSS SECTIONS A-A AND B-B
14	CROSS SECTION C-C

NOTES:

1. BASE MAP PROVIDED BY WESTON SOLUTIONS OF DETROIT, MICHIGAN.
2. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

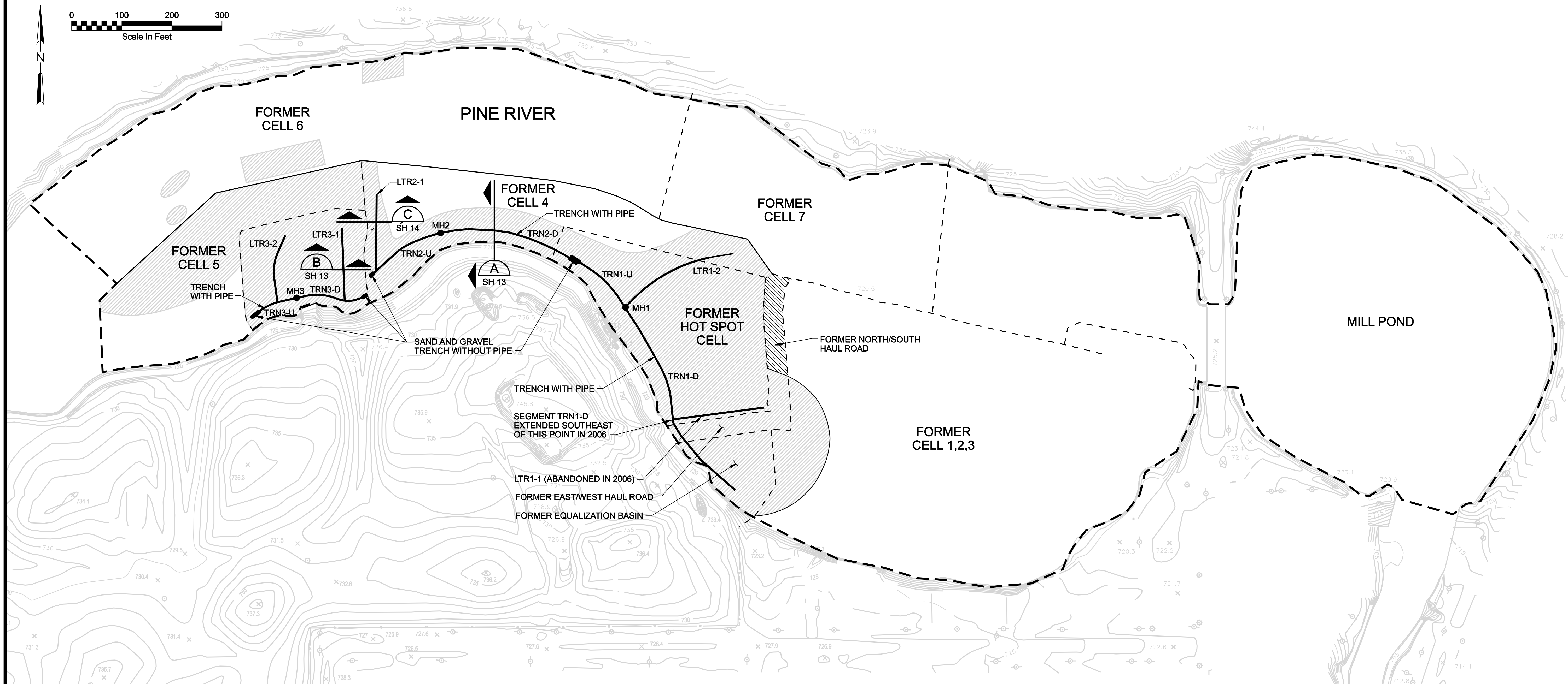
SHEET 1
SITE OVERVIEW
AND INDEX TO DRAWINGS

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME:
sheet01_184199.dgn

PLOT DATE:
13-SEP-2006



TRENCH LAYOUT

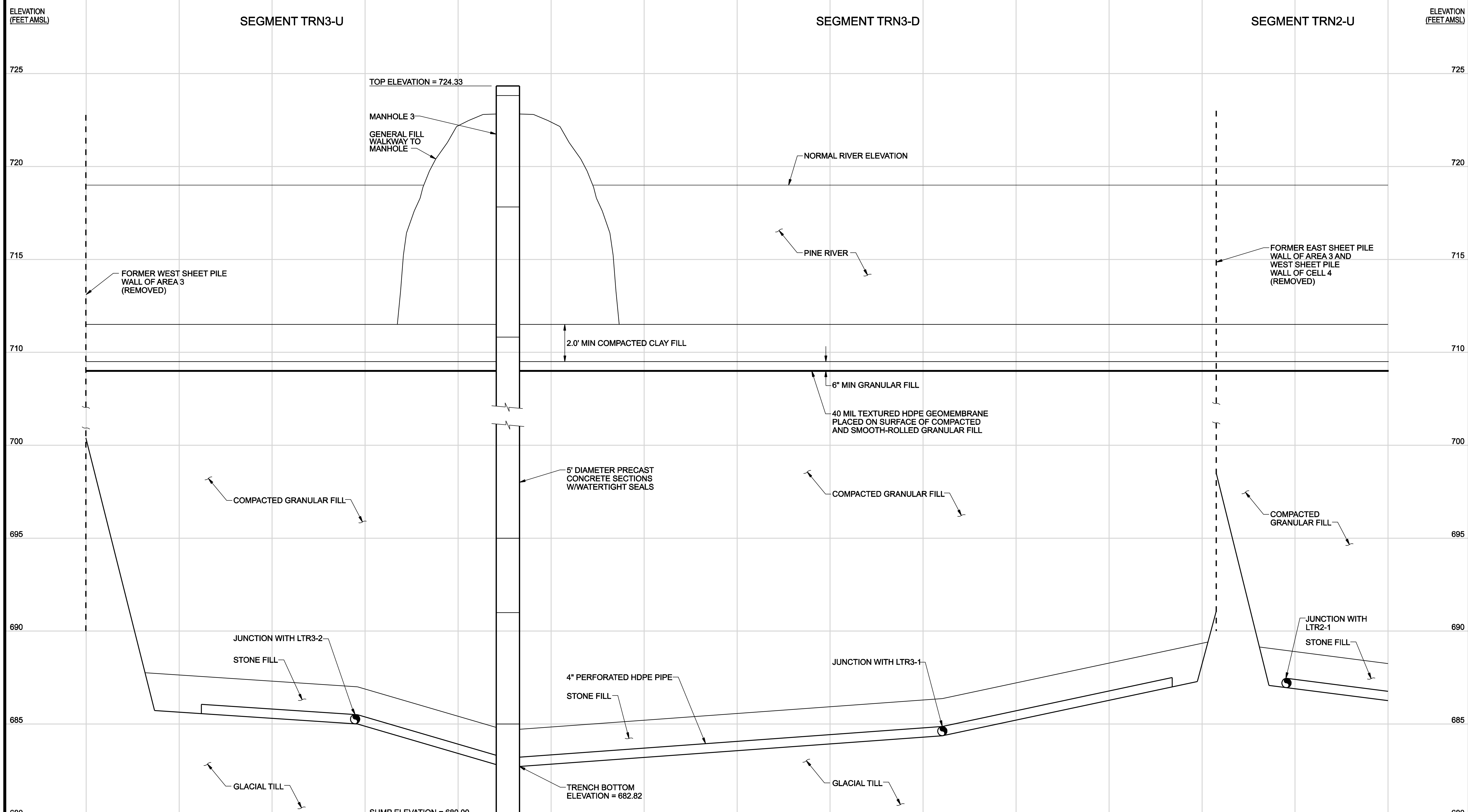
NOTES:
1. BASE MAP PROVIDED BY WESTON SOLUTIONS OF DETROIT, MICHIGAN.
2. LOCATIONS OF THE NAPL COLLECTION TRENCHES AND CLAY CAPPING AREAS SHOWN ARE ESTIMATED BASED UPON FIELD OBSERVATIONS, FIELD SKETCHES, PHOTOGRAPHS, AND SURVEYS.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

LEGEND
- ● MANHOLE
- AREAS CAPPED WITH CLAY
- AREAS COVERED WITH 6' - 8' OF CLEAN FILL LEFT IN PLACE (FROM FORMER HAUL ROAD)

SHEET 2
SITE PLAN
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet02_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE

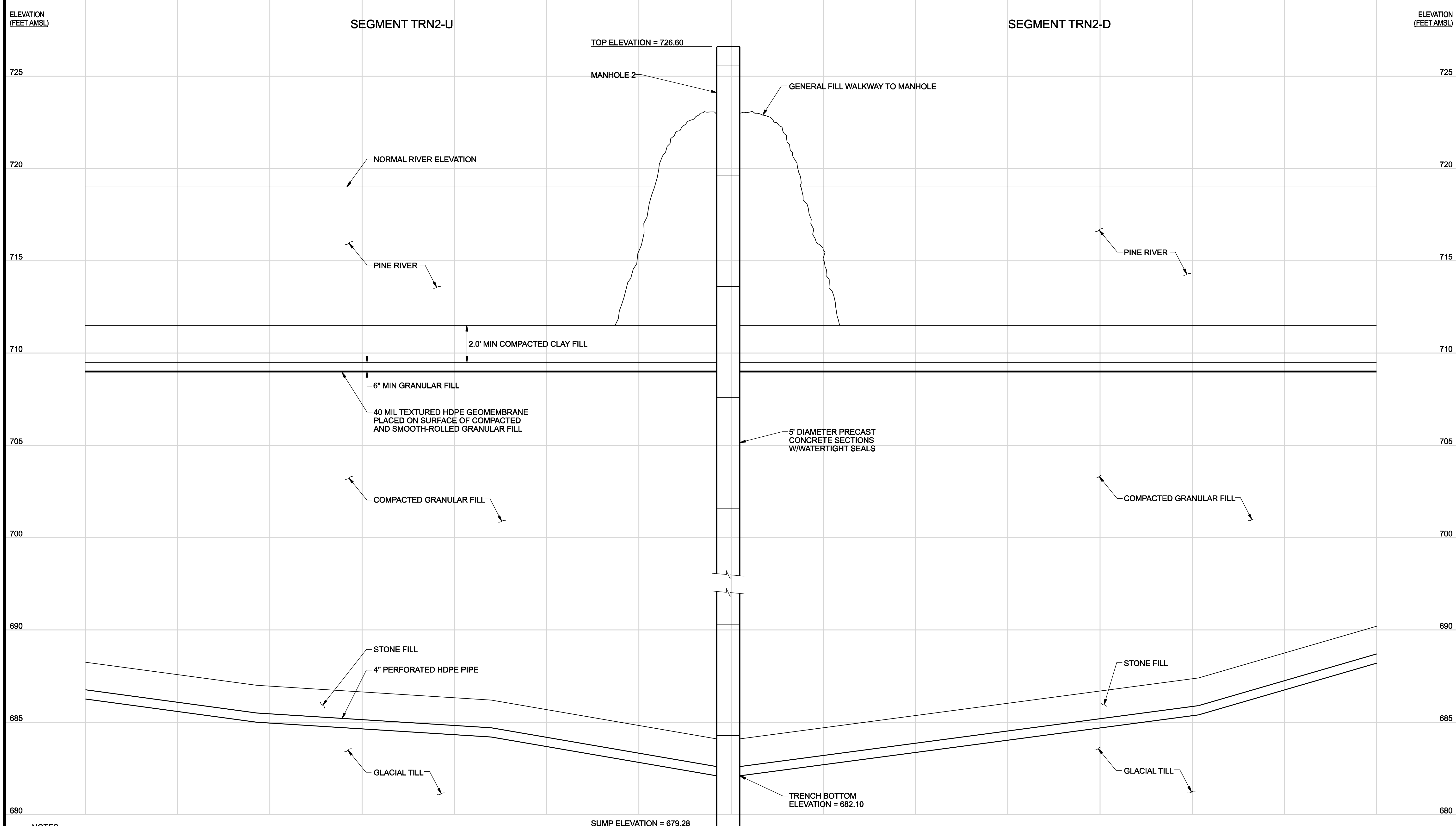
1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 3
PROFILE VIEW 1

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet03_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

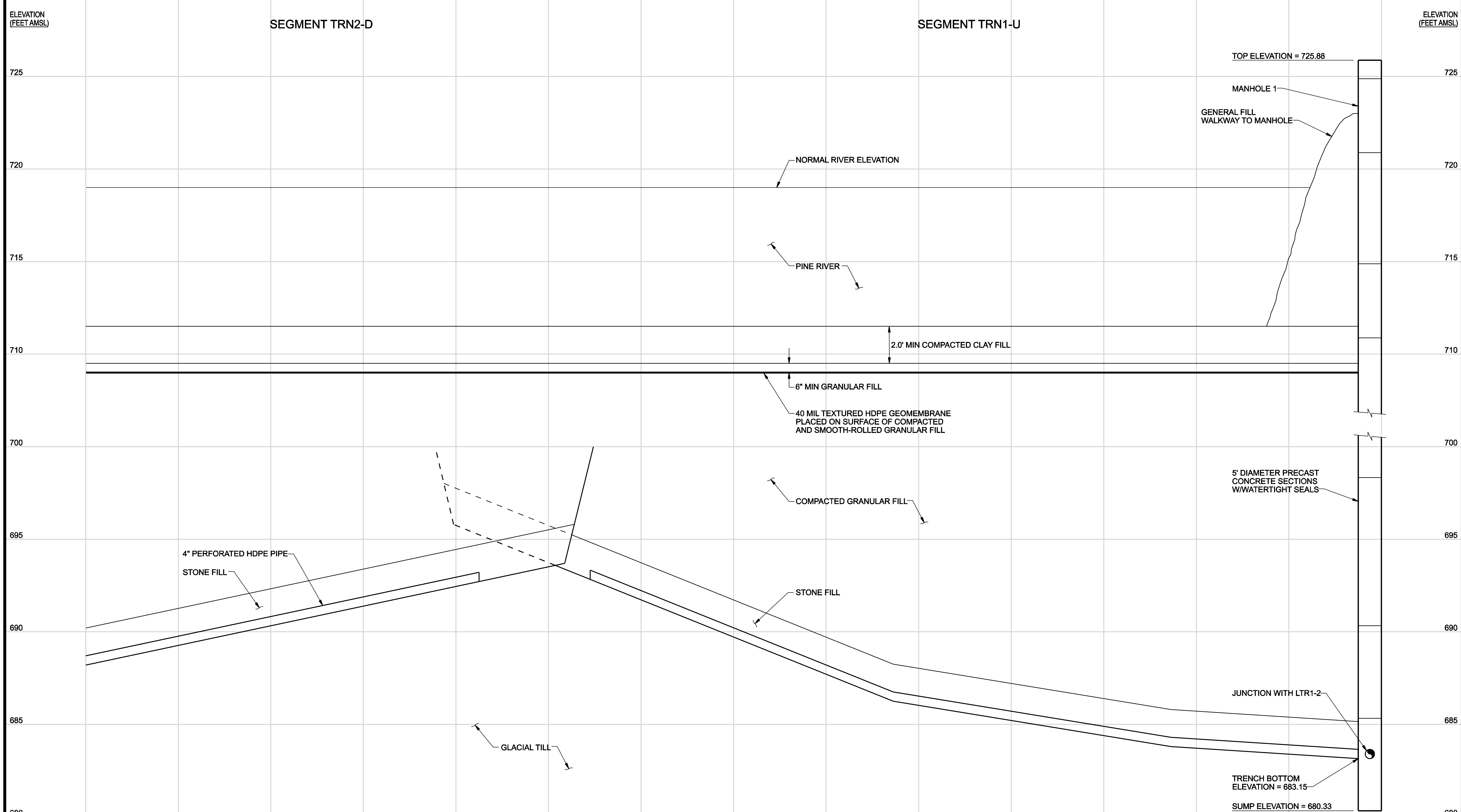
PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 4
PROFILE VIEW 2
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet04_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

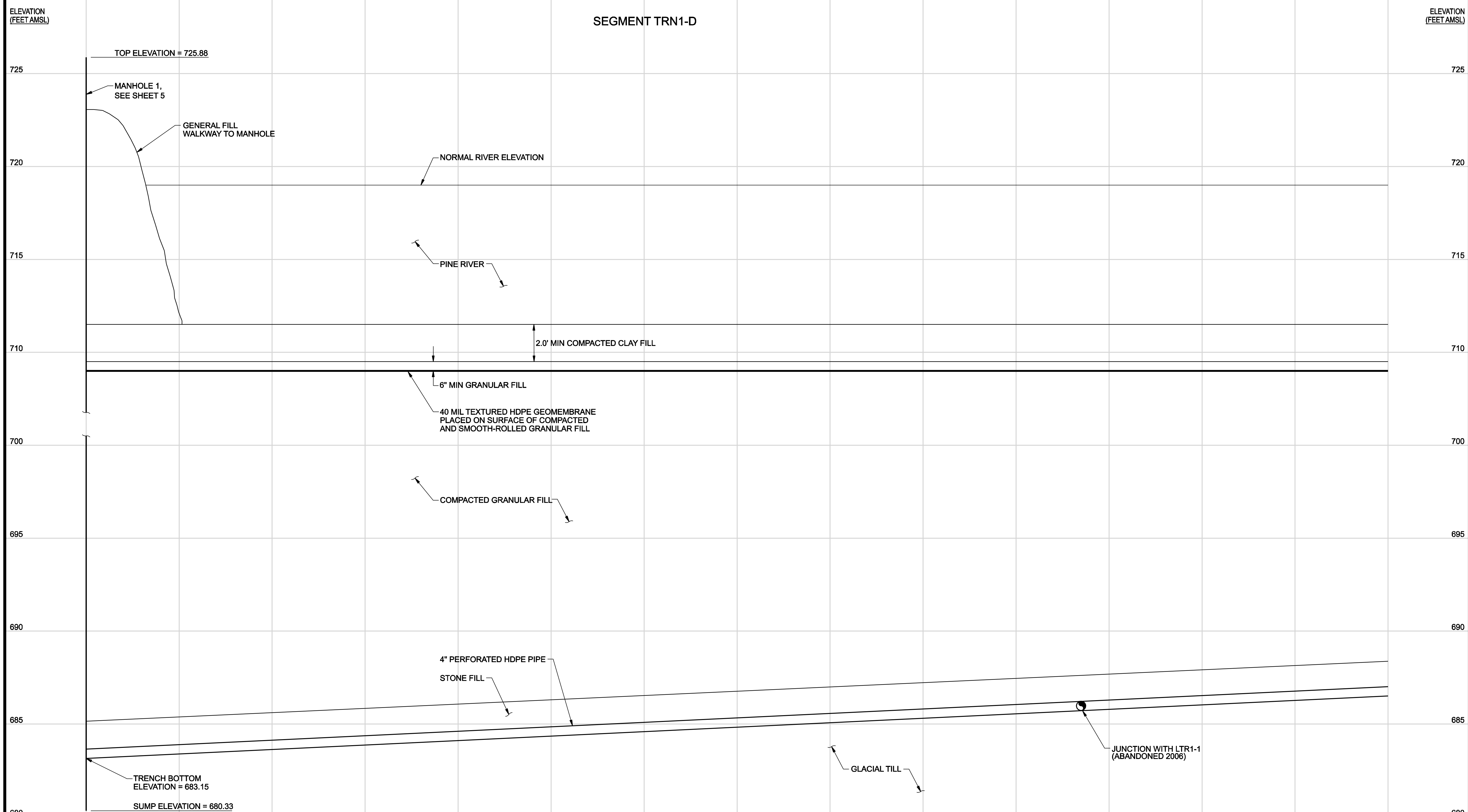
PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 5
PROFILE VIEW 3
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet05_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE

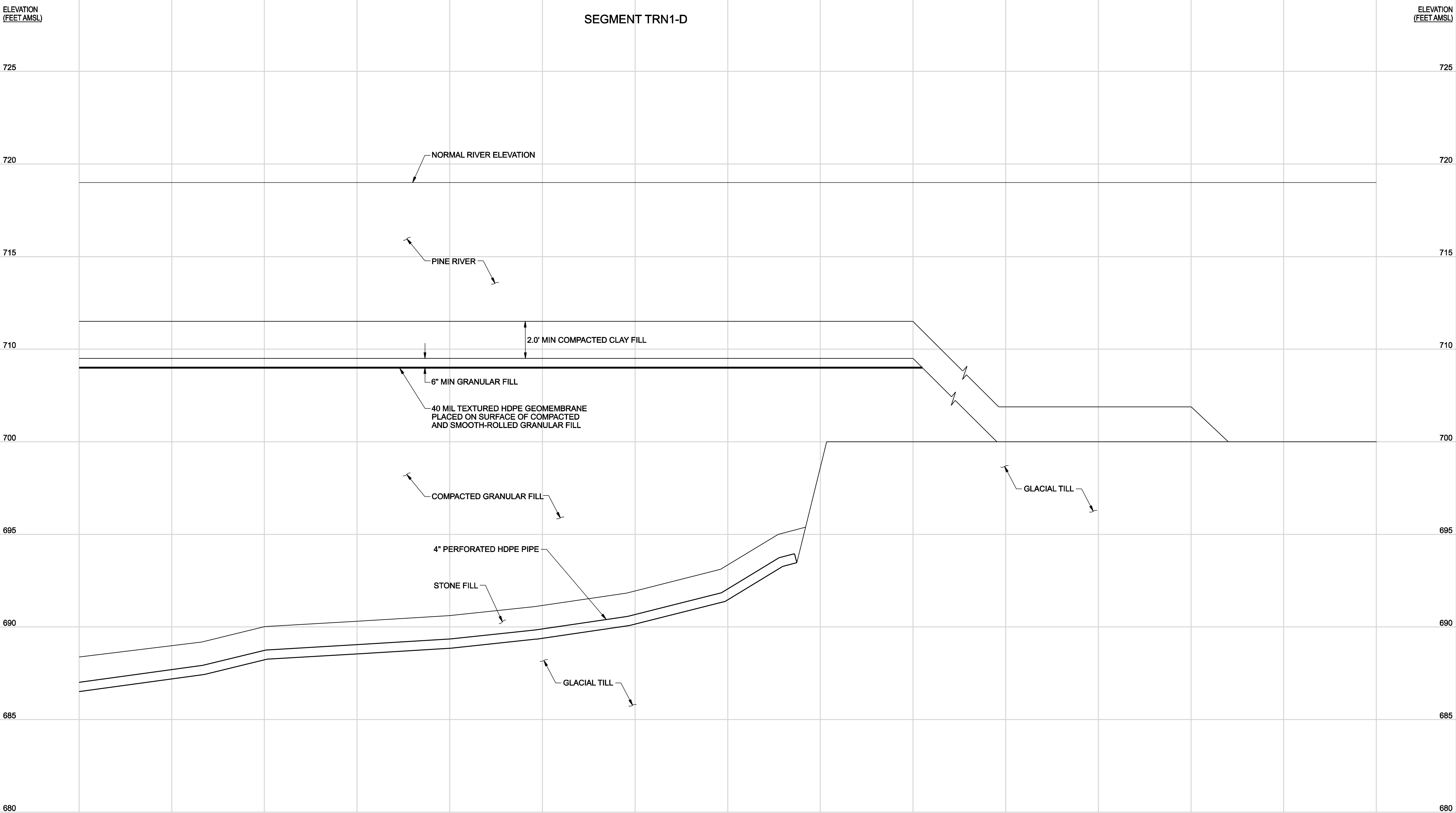
1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 6
PROFILE VIEW 4
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet06_184199.dgn

PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

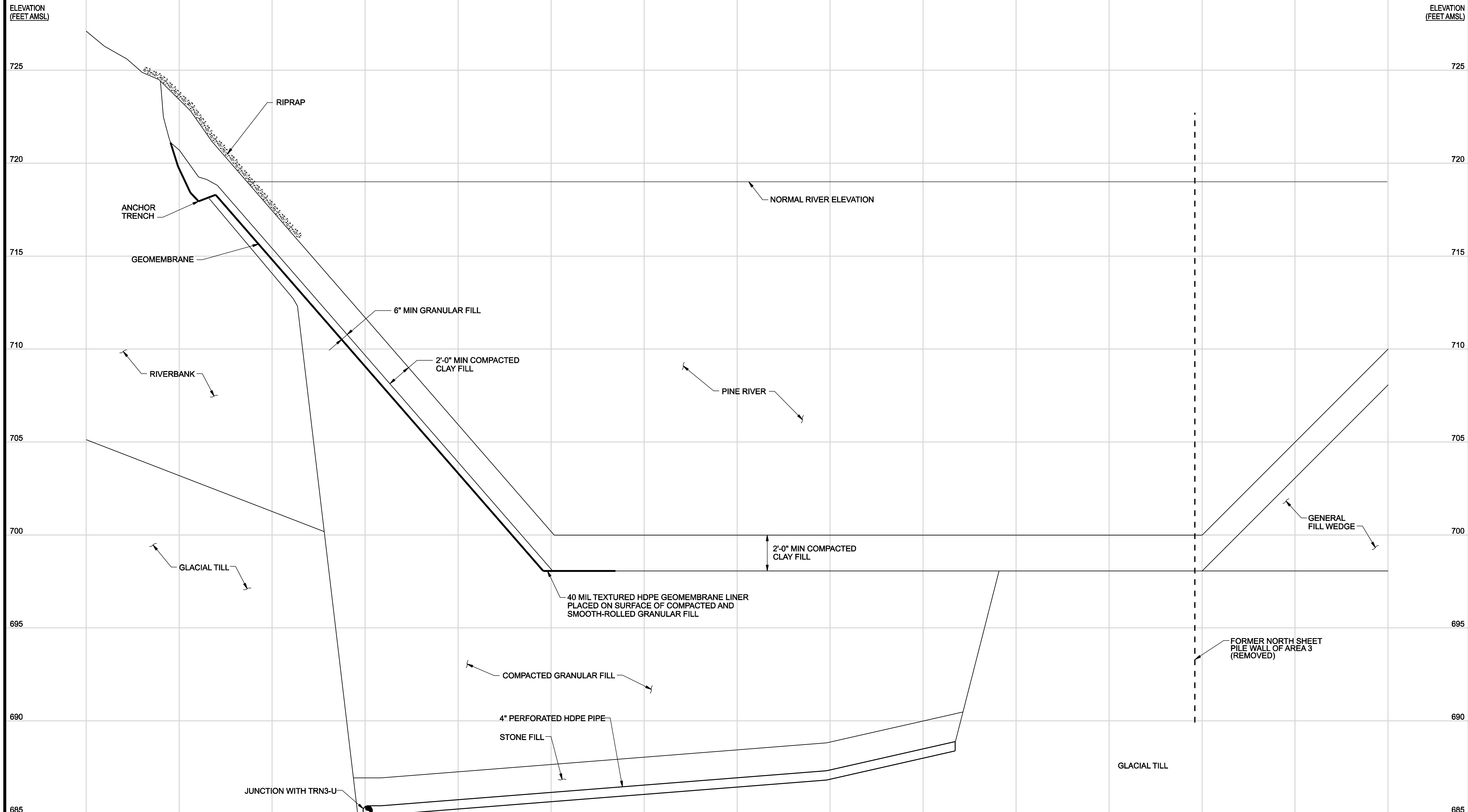
PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 7
PROFILE VIEW 5
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet07_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

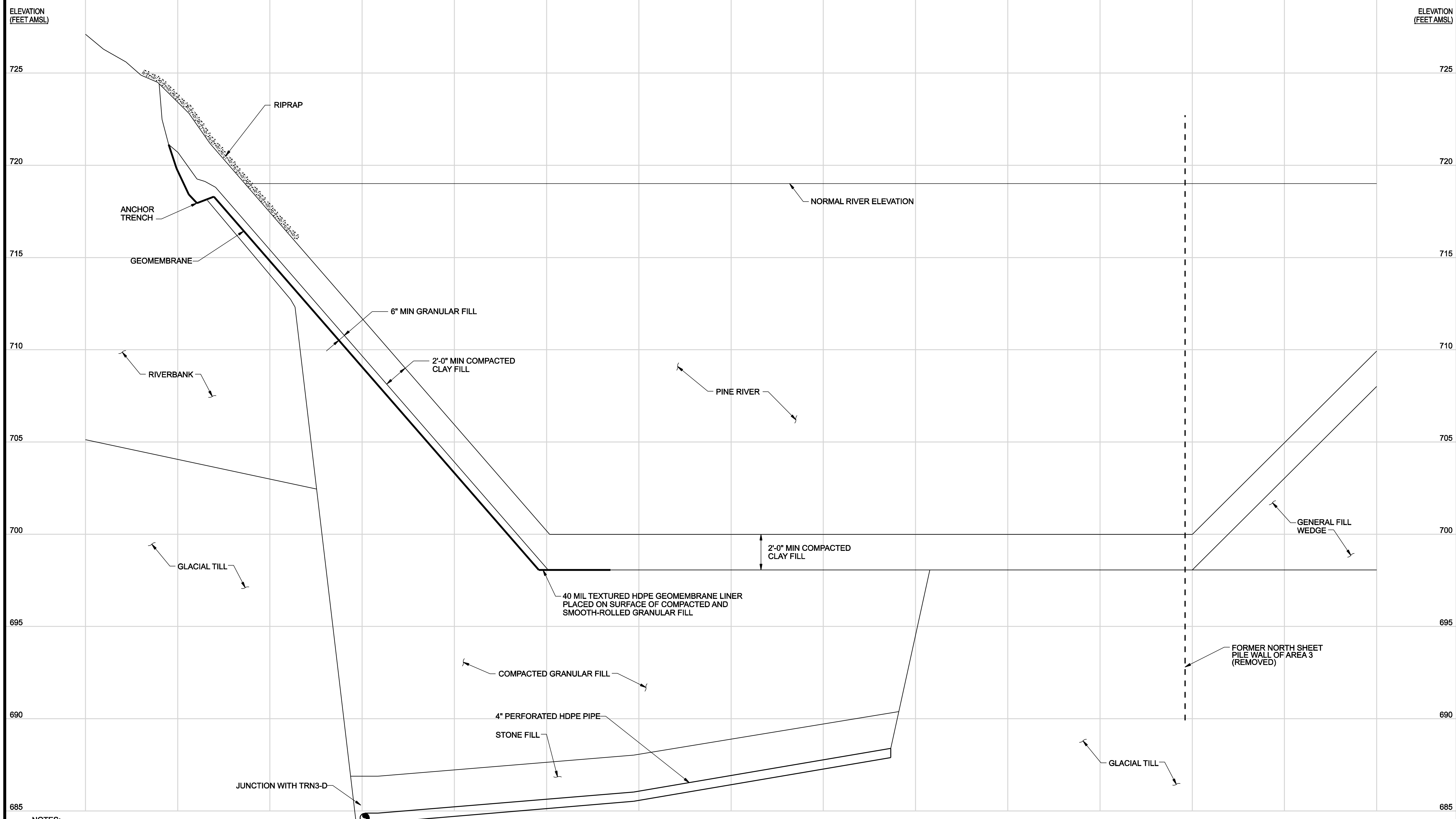
1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE
1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 8
LATERAL LTR3-2 PROFILE
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet08_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

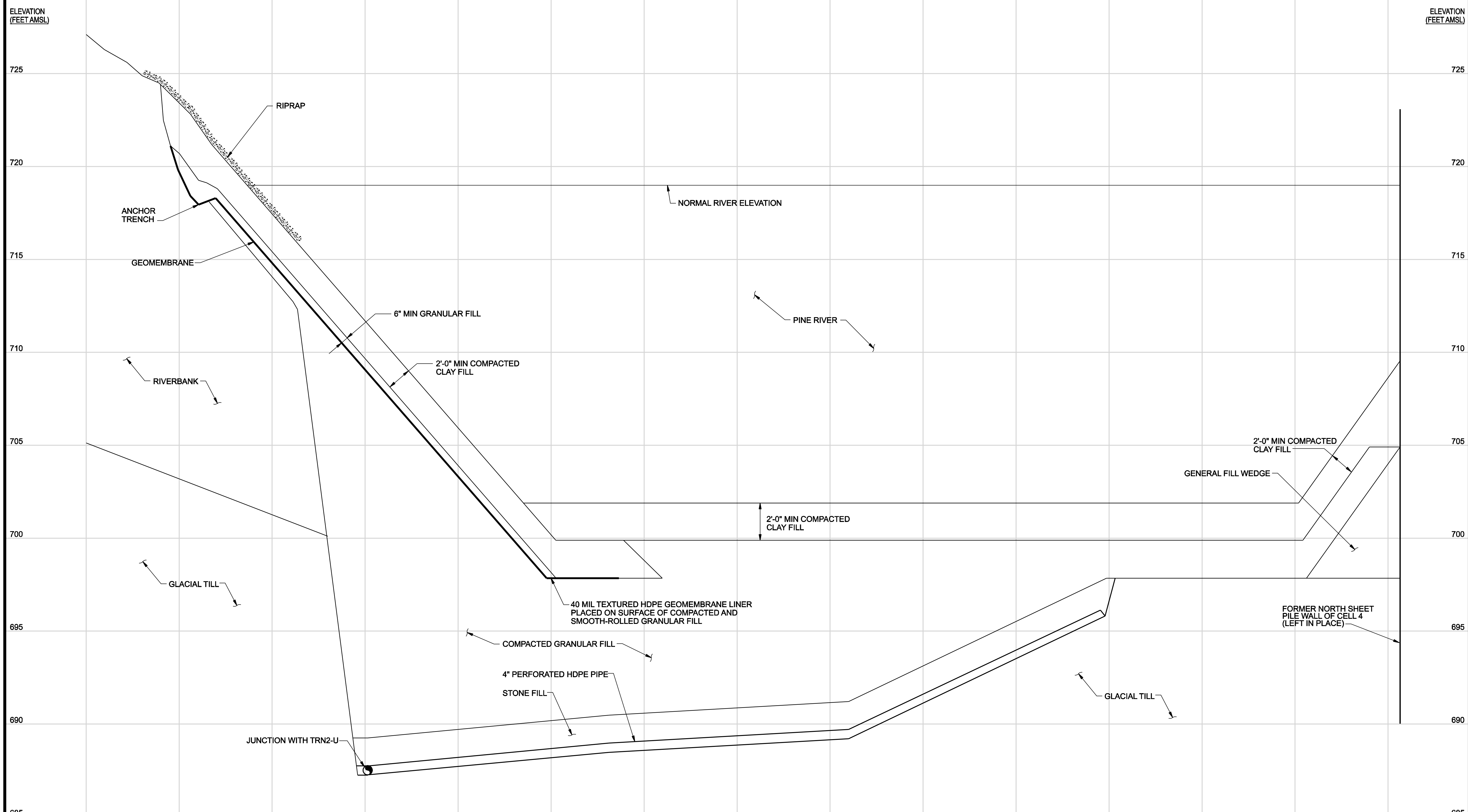
1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE
1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 9
LATERAL LTR3-1 PROFILE
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet09_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

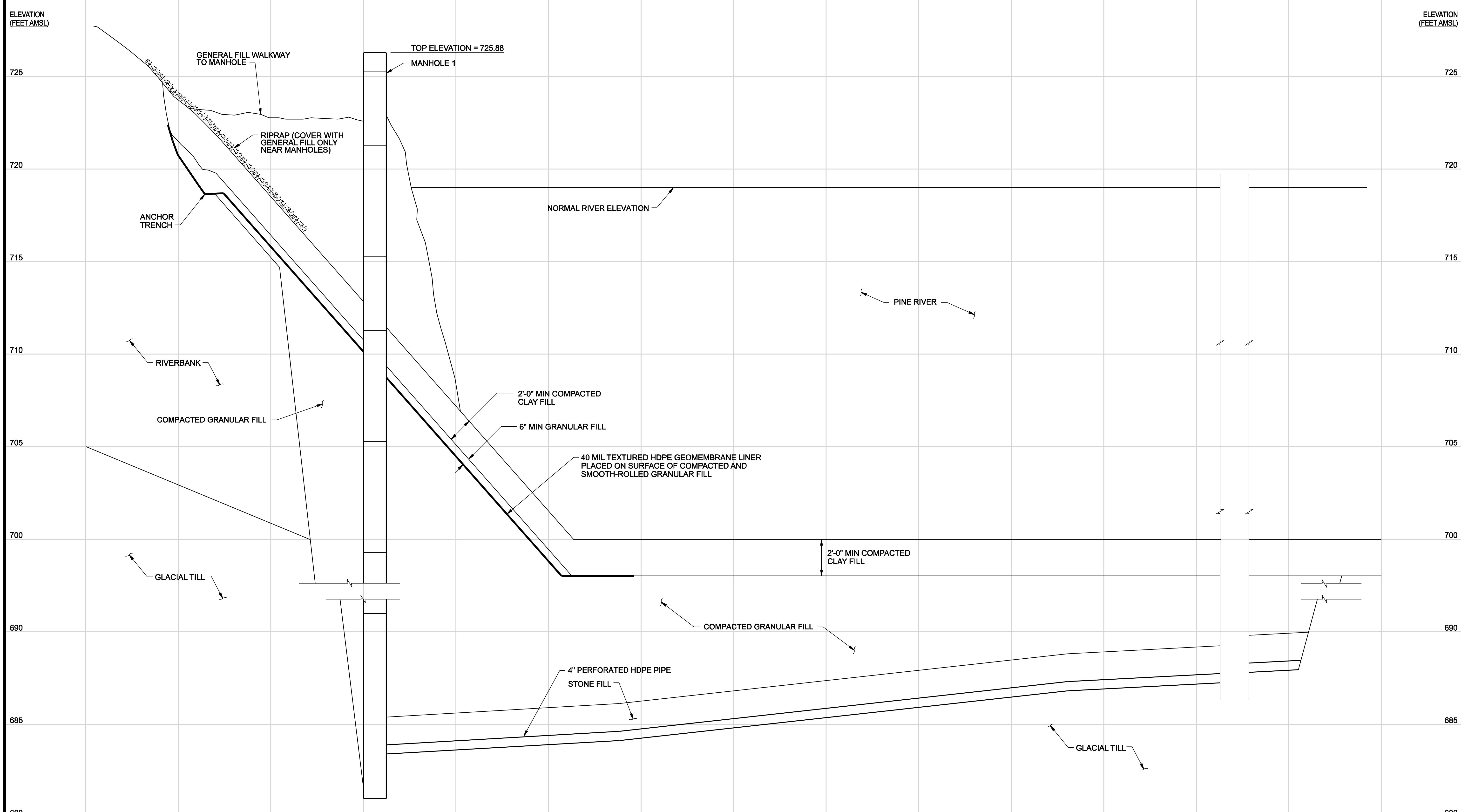
SHEET 10
LATERAL LTR2-1 PROFILE

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet10_184199.dgn

PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

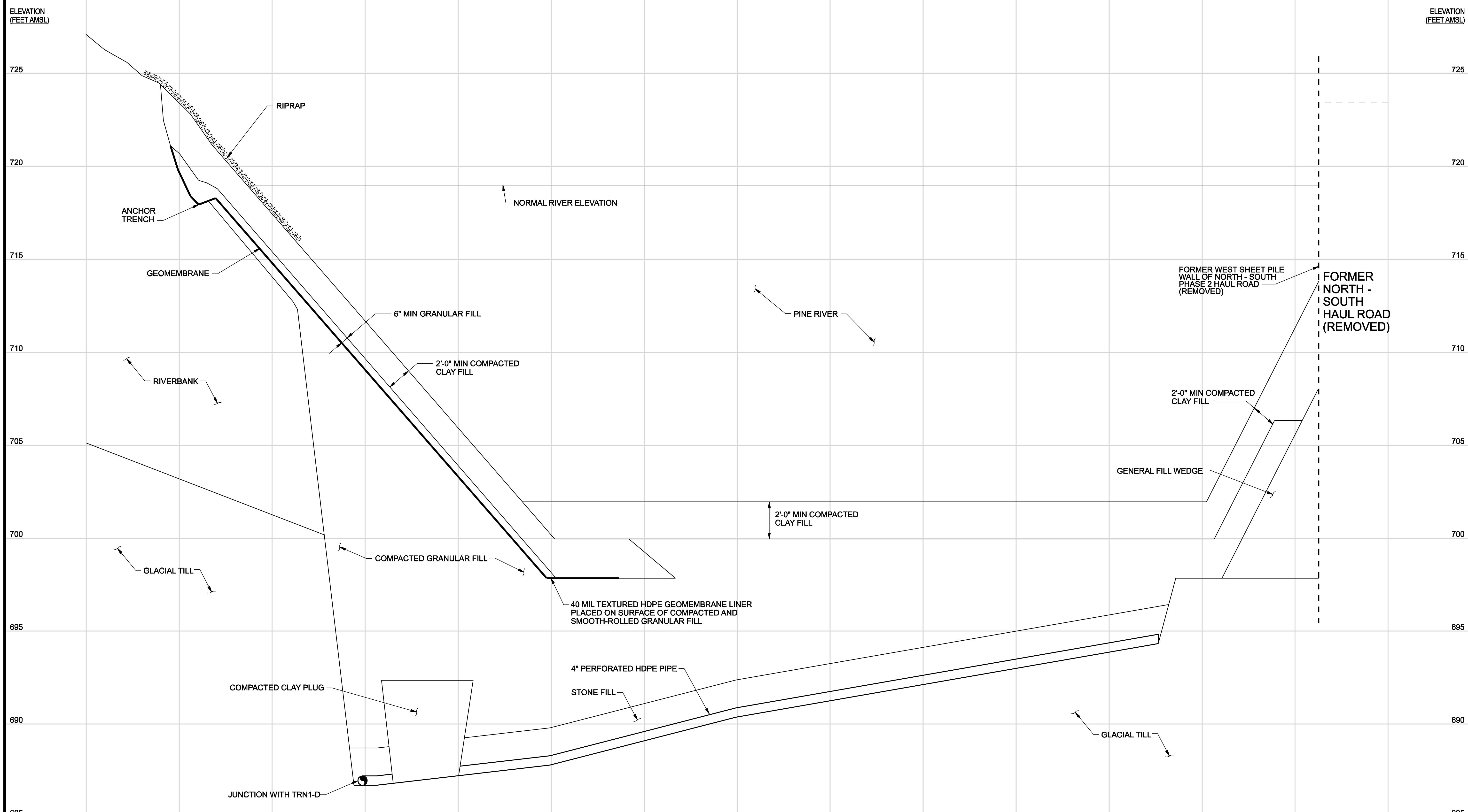
SHEET 11
LATERAL LTR1-2 PROFILE

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet11_184199.dgn

PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.
4. LATERAL LTR1-1 WAS ABANDONED IN 2006.

PROFILE

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

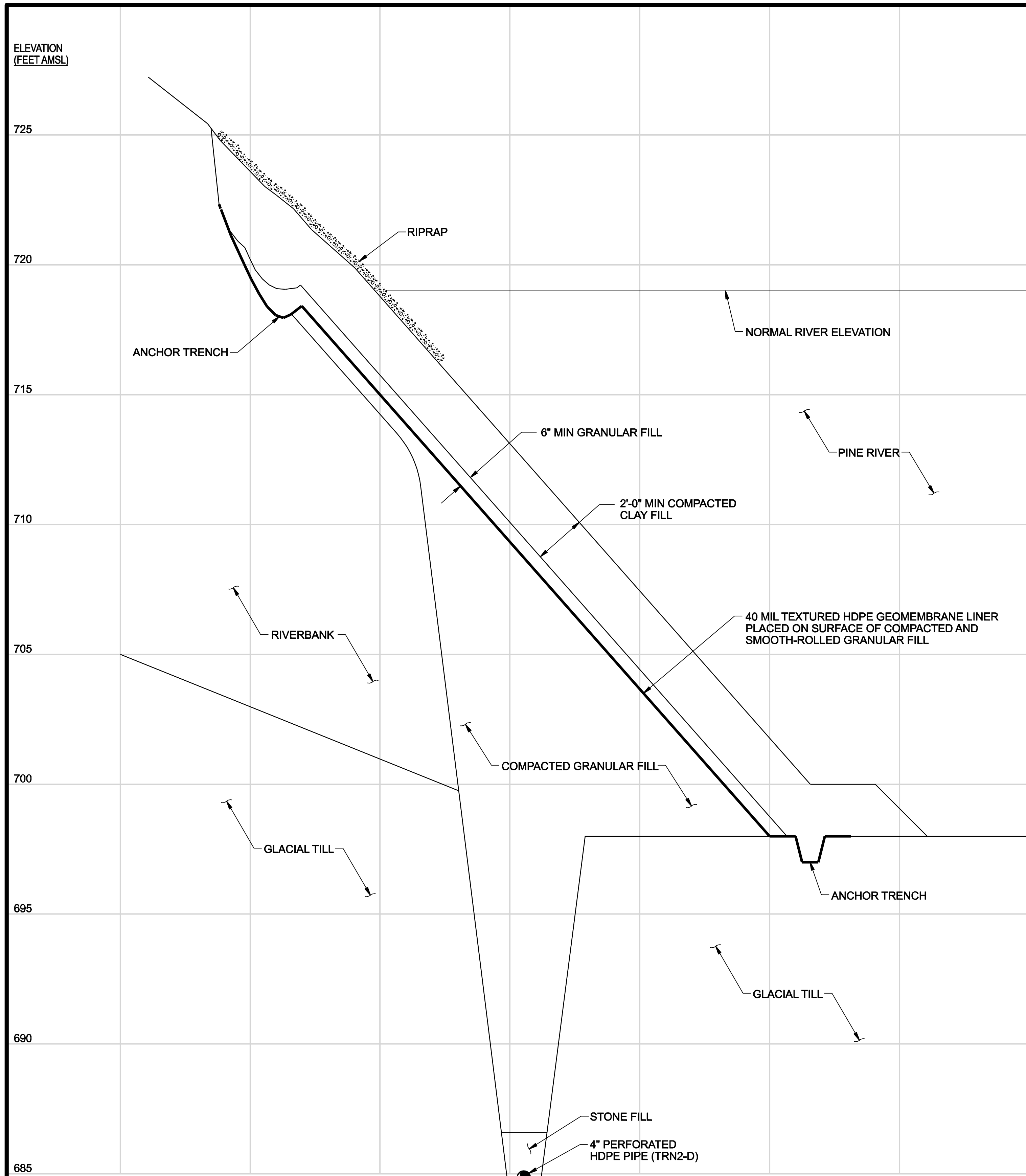
SHEET 12
LATERAL LTR1-1 PROFILE

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

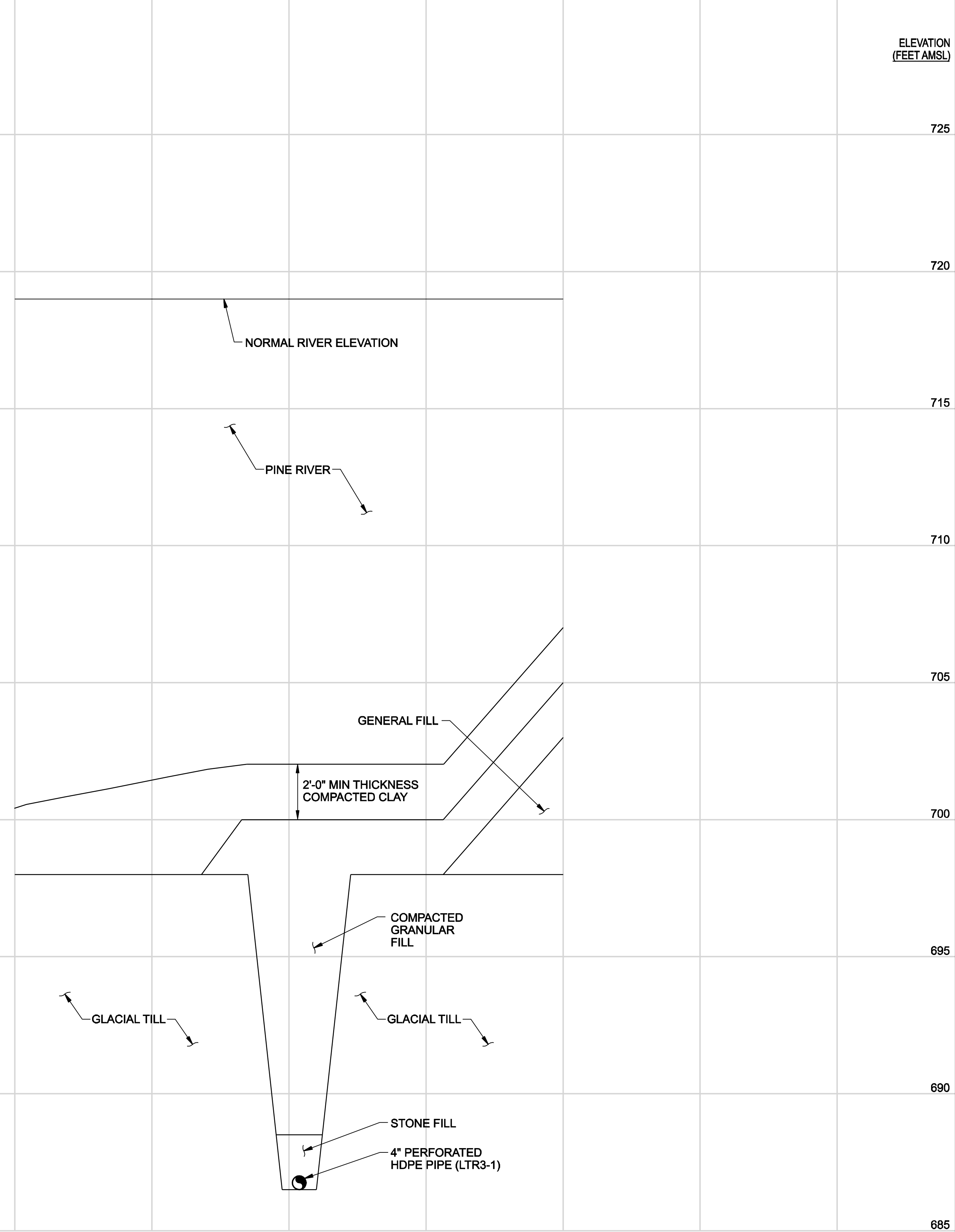
DRAWING NAME: sheet12_184199.dgn

PLOT DATE: 13-SEP-2006



CROSS - SECTION A-A

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL



CROSS - SECTION B-B

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

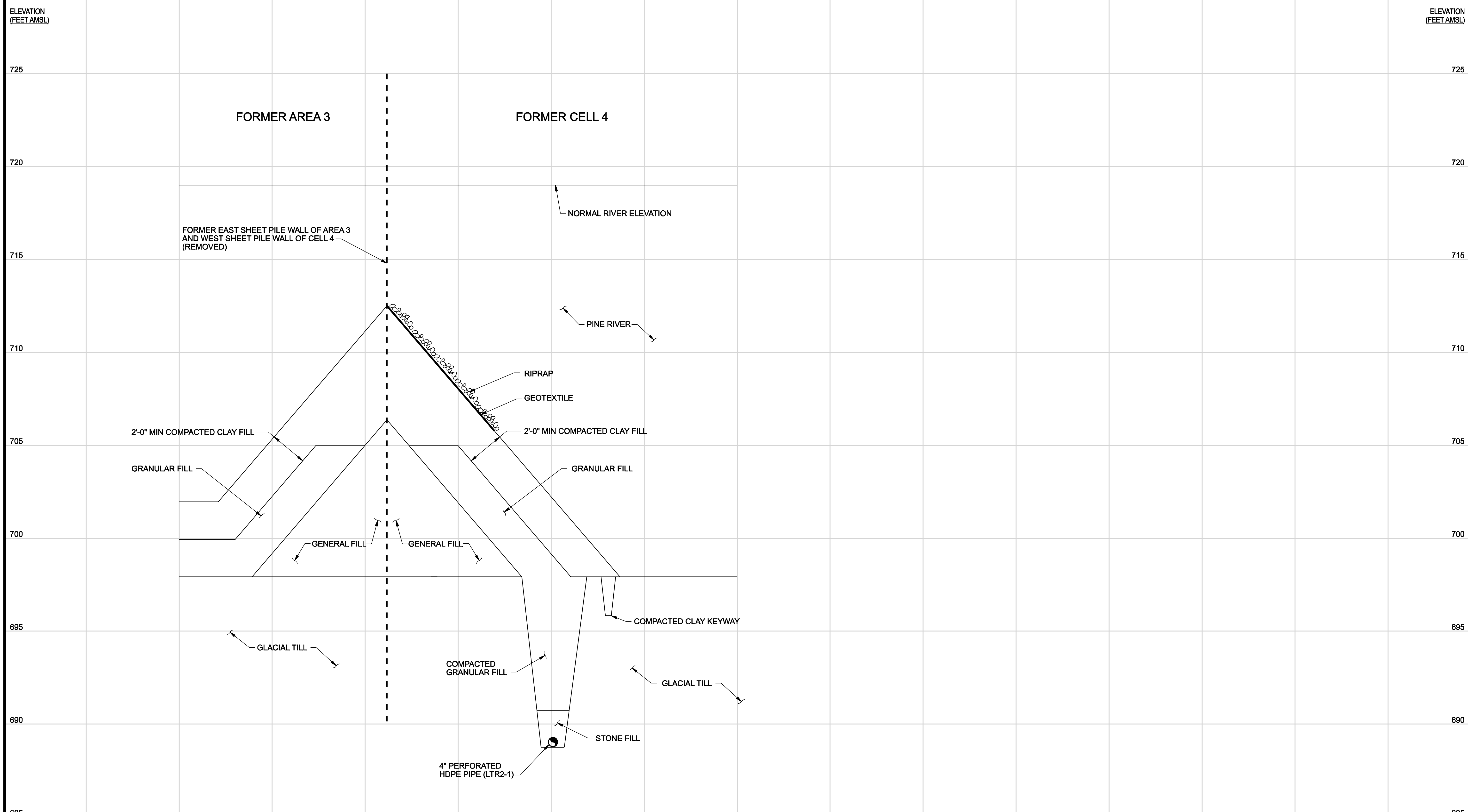
NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

SHEET 13
CROSS SECTIONS A-A AND B-B
VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet13_184199.dgn
PLOT DATE: 13-SEP-2006



NOTES:

1. ELEVATIONS OF NAPL COLLECTION TRENCH SEGMENTS, NAPL COLLECTION TRENCH LATERAL SEGMENTS, AND MANHOLES ARE BASED UPON FIELD SURVEYS.
2. GLACIAL TILL AND SEDIMENT SURFACE ELEVATIONS AND SHORELINE SLOPES SHOWN ARE AVERAGE VALUES BASED UPON SPOT CHECK SURVEYS DURING AND AFTER CONSTRUCTION.
3. ORIGINAL DRAWINGS COMPLETED FEBRUARY 2003.

CROSS - SECTION C-C

1"= 20'-0" HORIZONTAL
1"= 5'-0" VERTICAL

SHEET 14
CROSS SECTION C-C

VELSICOL/PINE RIVER SITE
ST. LOUIS, MICHIGAN
REVISED NAPL COLLECTION TRENCH
RECORD DRAWINGS

CH2MHILL

DRAWING NAME: sheet14_184199.dgn

PLOT DATE: 13-SEP-2006

Appendix E

Clay Cap Density Testing Results

Westshore Consulting
2534 Black Creek Rd., Muskegon, MI 49444
Ph: (231) 777-3447 Fax: (231) 773-3453
Service@WestshoreConsulting.com

Field Moisture & Density Determination - Nuclear Method (ASTM D 2922)

Project # 3268-3A Project Name: NATIONAL ENVIROMENTAL Date: 7-24-06
Inspector: D W WIELENGA Gauge No.: 22431

TEST		WET DENSITY			MOISTURE			DRY DENSITY			LOCATION OF TEST	
ORIGINAL	RECHECK	COUNTS (DC)	TEST DEPTH inch	WET DENSITY PCF	COUNTS (MC)	MOISTURE PCF	MOISTURE %	DRY DENSITY PCF	MAX DENSITY PCF	% OF COMPACTION	LOCATION	DEPTH BELOW PLAN GRADE FT
~~1~~		337	~~12"~~	233.8	162	14.0	6.4	219.8	137.0	~~[illegible]~~	DEPTH WRONG O LINE @ LINE 19	2
~~2~~		277	~~7~~	242.2	152	13.0	5.7	229.2	137.0	~~[illegible]~~	N LINE @ LINE 19	2
~~3~~		276	12	145.4	150	12.8	9.7	132.6	137.0	~~[illegible]~~	Bad PROCTOR	2
4	3	299	12"	142.9	148	12.6	9.7	130.3	137.0	95.1	N LINE @ LINE 18	2
5	2	291	12"	143.6	151	12.9	9.9	130.7	137.0	95.4	N LINE @ LINE 19	2
6	1	327	12"	139.8	157	13.5	10.7	126.4	137.0	92.2	O LINE @ LINE 19	2
7		300	12"	142.7	144	12.2	9.4	130.5	137.0	95.2	P LINE @ LINE 20	2
8		293	12"	143.5	141	11.9	9.1	131.5	137.0	96.0	P LINE @ " 23	
9		294	12"	143.3	145	12.3	9.4	131.0	137.0	95.6	Q LINE @ " 23	
10		292	12"	143.5	157	13.5	10.4	130.0	137.0	94.9	Q LINE @ LINE 21	
11		305	12"	142.2	143	12.1	9.3	130.0	137.0	94.9	R LINE @ LINE 21	
12		328	12"	139.7	168	14.6	11.6	125.1	137.0	91.3	R LINE @ LINE 21	
13		321	12"	140.6	134	11.3	8.7	129.3	137.0	94.4	N LINE @ LINE 20	
14		291	12"	143.7	133	11.2	8.4	132.6	137.0	96.8	O LINE LINE 22	

ITEM OF WORK / SOIL CLASSIFICATION	CHART STANDARDS		OPERATING STANDARDS		BITUMINOUS MIX DESIGN PCF
	DENSITY	MOISTURE	DENSITY	MOISTURE	
[illegible]E SOIL RIVER BED	2738 / 2793	635	2762	635	

Appendix F

Proposal to Leave Sheet Piling in Place Memorandum

Proposal to Leave 1480 LF of Sheet Pile in Place Velsicol Chemical/Pine River Site, OU2

TO: Becky Frey/USEPA

COPIES: Gina Bayer/CH2M HILL

FROM: Rob Stryker/CH2M HILL
Dan Lynch/Ecology & Environment

DATE: June 23, 2006

Background

Approximately 2,700 linear feet of PZ-27 sheet piling are currently in place in the Pine River and are slated to be extracted at the conclusion of the remedial activities in July and August, 2006. The purpose of this memorandum is to describe the advantages and disadvantages of leaving some of the existing sheet piling in place at the conclusion of the work this season rather than extracting it as planned, with the idea that the remaining sheet piling may eventually be incorporated into the remedy for OU1 (the former plant site). A total of approximately 1,480 linear feet of sheet piling (50 percent of existing in-place sheet piling) is proposed to be left in place, as shown on Figure 1 (note that the configuration of sheet piling proposed to be left in place is correct as shown on Figure 1, but the configuration of other sheet piling is not current).

Use of Sheet Piling in Proposed OU1 Remedies

Essentially all non-" No Action" remedial alternatives for the former plant site (hereafter referred to as the "site") that have been discussed between USEPA and MDEQ in the past three years involve either (1) some form of containment around the perimeter of the site or (2) excavation and disposal of soils from the site. In either type of remedy, a sheet pile wall would be necessary around the site perimeter. If the containment option is chosen this existing sheetpile wall could be incorporated into the final remedy and make permanent the temporary containment system that was installed to collect DNAPL and isolate the impacted till/sand seams from the river. If the excavation option is chosen it would still be necessary to isolate the river and de-water the shoreline to be excavated. This existing sheetpile wall would be adequate for this purpose as well.

Containment Alternatives

The containment alternatives discussed all require sheet piling to be installed around the entire site. The watertightness of sheet piling driven deeply into glacial till would need to be improved after installation, since extreme driving forces generated during impact driving typically cause some damage to the interlocks (or joints) between the individual sheets. It is unlikely that other types of sheetpiling with joint sealing methods would allow for the extreme forces required to penetrate the glacial till and still achieve an adequate seal. Therefore, it is likely that installation of sheetpiling similar to the existing would be necessary due to the extreme driving conditions required for penetration of the till. The most likely method of improving watertightness of sheet piling is constructing an HDPE barrier over the interior face of the sheet piling. Improving the water tightness of the sheetpiling could be done just as easily with the existing sheet piling as with a new sheet pile wall.

Excavation Alternatives

In order for any alternative that involves excavation of contaminated soils to be successful, the river has to be retained so the contaminated soils between the slurry wall and the river ("residual contamination") can be dewatered and removed. This sheet pile wall does not have to be exceedingly watertight because pumping and treatment of infiltrating groundwater will be ongoing during the remedial activities, and then the sheet piling will be extracted following completion of excavation and backfilling activities. The existing sheet piling has already been used for this purpose, and therefore would be suitable for dewatering again. If the excavation alternative is chosen the impacted till and laterals that exist below the river and sealed with a clay cap cannot be removed due to their depth. It would be still be necessary for the containment cap to remain intact. Figure 2 depicts the location of the existing interceptor trench, laterals, and areas capped with clay. Note the configuration of sheet piling on this figure is not current.

Advantages to Leaving Sheet Piling in Place

Prevents Damage to NAPL Collection Trench and Clay Cap

The NAPL collection trench system was installed during remedial activities in 2002 to address DNAPL seepage from shoreline and from the sand seams in the glacial till below the sediment. A total of three main segments (which slope to central manholes) and five lateral segments (which extend out into the river perpendicularly to the shoreline) were constructed. A clay cap was installed over impacted till (that was impractical to excavate) to help prevent migration of contaminants into the river. An additional trench segment is likely going to be installed in June and July, 2006, where the equalization basin was formerly located. The NAPL collection trench and clay cap were intended as temporary measures to protect the river until the former plant site could be addressed. It should be considered a "soft patch" rather than a permanent remedy because while it protects the river from contaminates migrating from the Main Plant site it is subject to external mechanical damage from future construction activities or investigations that could compromise the containment system.

The NAPL collection trench laterals are filled with granular material and capped with clay to allow DNAPL (and contaminated water while extraction is ongoing) to move toward the manholes rather than upward toward the river. The laterals are contained within the boundaries of the existing sheet piling. If this sheet piling is removed and new sheet piling is installed, it would be necessary to install it in the same location for the following reasons:

- There is virtually no sediment remaining in which to set the sheets because it was excavated during remedial activities. The existing wall was set in sediment and driven into the till. This sediment afforded sufficient support for the sheets when they were initially set with a vibratory hammer. With no sediment for support, it is more difficult to get the sheet piling to remain vertical while setting with a vibratory hammer, and vertical alignment is essential for subsequently driving the sheets into the dense glacial till with an impact hammer. Sediment also tends to provide some seal for dewatering. Experience has shown that setting sheets directly into till without sediment or a berm gives a high probably for "boils" (e.g., unexpected, sudden channels forming in the till underneath the sheet piling that can rapidly erode and worsen with the potential to cause flooding of the area and failure of the sheetpile wall). During the remedial activities, an earthen berm was placed against the existing sheet pile wall as the sediment was removed to give support and seal the wall against these boils. Since excavation was completed on both sides of the existing sheetpile it has a berm on both sides to aid in sealing the wall. Therefore, new sheet piling would best be installed where the earthen berm is located.

- If new sheet piling is installed closer to the site than the existing sheet piling, the laterals and the clay cap would be compromised. It is not clear how well the clay cap and laterals would seal following penetration with the sheet piling. There is a risk that there could be a direct conduit formed from the laterals and impacted till to the river, and an even greater risk exists if the selected OU1 remedy requires that this sheet piling be removed later (e.g., a excavation remedy is selected). Additionally, there is potential for damage to be caused to the clay cap from the barge anchor "spuds" while setting new sheet.

- If a new sheet pile wall is installed significantly closer to the site than the existing wall, there is the risk of compromising the HDPE liner as well as the clay cap that covers the entire slope of the shoreline. The HDPE liner extends between seventy-five and one hundred feet into the cells from the waterline. Any breach of the containment components of the NAPL collection trench system would impact its ability to protect the river.

- If the containment remedy is chosen the existing sheetpile wall could become the site boundary. This would provide ample additional volume for "Burn Pit" material and any residential property excavation that was needed as well as excess material from site re-grading. The material on top of the clay cap and HDPE liner would provide mechanical protection as well as further isolation from the river. There would be no risk of breaching the "soft patch" except with borings. The existing manhole/lateral system could remain in place and be used for DNAPL extraction and incorporated into the hydraulic gradient control plan. The proposed intercept trench for the containment option as depicted in the Draft Alternatives Array Document (Weston, April 2006) would bisect the existing laterals. The trench could be installed adjacent to the existing sheetpile wall giving added protection and leaving the existing laterals intact.

Cost Savings

A significant and obvious advantage to leaving the existing sheet piling in place is cost savings. Sheet piling of similar type and dimensions as the existing material is estimated to cost $220 per linear foot for installation and $500 per linear foot for material, although steel prices have continued to skyrocket for the last several years due to huge international demand so future prices could be significantly different (probably higher). Extraction of the existing wall would be done at $150 per linear foot. Based on these prices, total cost savings for leaving the existing 1480 linear feet of sheet piling in place versus extraction and replacement would be $1,287,600.

Schedule

A secondary advantage of leaving the sheet piling in place is a positive impact on schedule, both this year and whenever the final remedy is implemented. This year, an estimated three weeks would be saved.

Disadvantages to Leaving Sheet Piling in Place

Sheet Piling Not Incorporated into Final OU1 Remedy

In the unlikely event that the existing sheet piling is left in place and it is determined to not be useful for the long-term OU1 remedy, the main disadvantage is that it will need to be extracted at a later date and the cost for extraction would not be borne under this contract. The overall cost for sheet piling removal is currently $150 per linear foot (which includes the subcontractor taking possession of the sheet piling following extraction and decontamination), meaning that the current cost for removing the 1,480 linear feet of sheet piling is $222,000, not including mobilization and demobilization costs. Mobilization and demobilization costs are currently $250,000 combined, but this will only be an additional cost in the future if no other sheet piling work needs to be done at the time the sheet piling is removed.

OU1 Remedy Selected is Containment

The main disadvantage of using the existing sheet piling if containment is selected as the remedial alternative for OU1 stems from the fact that the sheet piling proposed to be left in place was installed in 1999 and has been exposed to the environment for seven years already. Since it was not originally intended to become part of a permanent remedy, no measures were taken to help protect it from corrosion due to exposure to the environment. The lifespan of installed steel sheet piling varies based on a number of factors, including the type of steel, thickness of the section, climate, exposure to groundwater and surface water, and types of chemicals present in the water. The expected design life of a steel sheet pile wall is typically derived by estimating the length of time a certain percentage of the steel thickness will corrode. If desired, protective measures can be implemented, such as application of a protective coating or incorporating cathodic protection. Also, a thicker sheet piling section can be specified initially whereby a portion of the thickness is considered sacrificial to corrosion.

A quick estimate of the expected lifespan of the existing sheet piling as installed indicates it ranges between 24 and 57 years (see Appendix A, refer to "PZ-27" calculations). The portion of the existing sheet pile wall subject to the most corrosive action is the three or four feet right at the river level (because it is intermittently wet and dry and also subject to freeze/thaw cycles). This portion can easily be inspected by having the municipal dam operator lower the water level, and if necessary can be covered with an epoxy coating to slow down the rate of corrosion. Additional information regarding the condition of the proposed sheet piling to be left in place can be gleaned by inspection of the sheets just downstream following extraction in July and August, 2006.

In summary, the existing sheet piling has already been exposed to the environment and has been corroding for seven years, which represents between 12% and 28% of its expected lifespan. The existing sheet piling can be provided with a protective coating over the most critical zone to slow the rate of corrosion in the future. However, it is likely that this segment of the OU1 sheet pile containment wall would be the section that would require replacement first. It should be pointed out that all sections of sheet piling installed as part of a permanent remedy would eventually need to be replaced; replacement would be done by installing a second wall outside of the existing wall, excavating into the containment cap to install any tieback anchors, attaching the second sheet pile wall to the tiebacks, and repairing the cap, and replacement can be done in sections rather than replacing the entire wall at once. However, despite this likelihood of a shorter lifespan than the rest of the wall, the existing sheet piling could serve at a minimum several decades and quite likely a significantly longer timeframe before new sheet piling had to be installed over that segment.

OU1 Remedy Selected is Excavation and Disposal

If an excavation alternative is selected, there is no significant disadvantage to using the current sheet piling compared to a newly-installed wall. The expected lifespan of the existing wall is such that it should serve suitably as a temporary installation for dewatering for at least another fifteen years. Visual inspection prior to and during use of the existing wall for dewatering should be done to verify its integrity. This would reduce the risk of placing another wall and compromising the NAPL collection system.

Figure 1. Sheet Piling Proposed to Be Left in Place
Velsicol Chemical/Pine River Site in St. Louis, Michigan
Proposal to leave 1480 LF of Sheet Piling in Place Memorandum

Scale: 1″= 233′

Aerial photo dated October 18, 2005

Appendix A
Estimate of Sheet Piling Corrosion
Velsicol Chemical/Pine River Site
June 14, 2006

Note: this is a "back-of-envelope" calculation to determine rough expectation for sheet pile wall longevity.

Assumptions:

PZ-27 ASTM A572 Grade 50

Thickness	0.375	in
	9.5	mm
Estimated failure point (% corroded)	30	percent
Rate of corrosion, uncoated, low end	0.05	mm/yr
Rate of corrosion, uncoated, high end	0.12	mm/yr
Rate of corrosion, coated, low end	0.03	mm/yr
Rate of corrosion, coated, high end	0.06	mm/yr
Lifespan, uncoated, low end	24	yr
Lifespan, uncoated, high end	57	yr
Lifespan, coated, low end	48	yr
Lifespan, coated, high end	95	yr

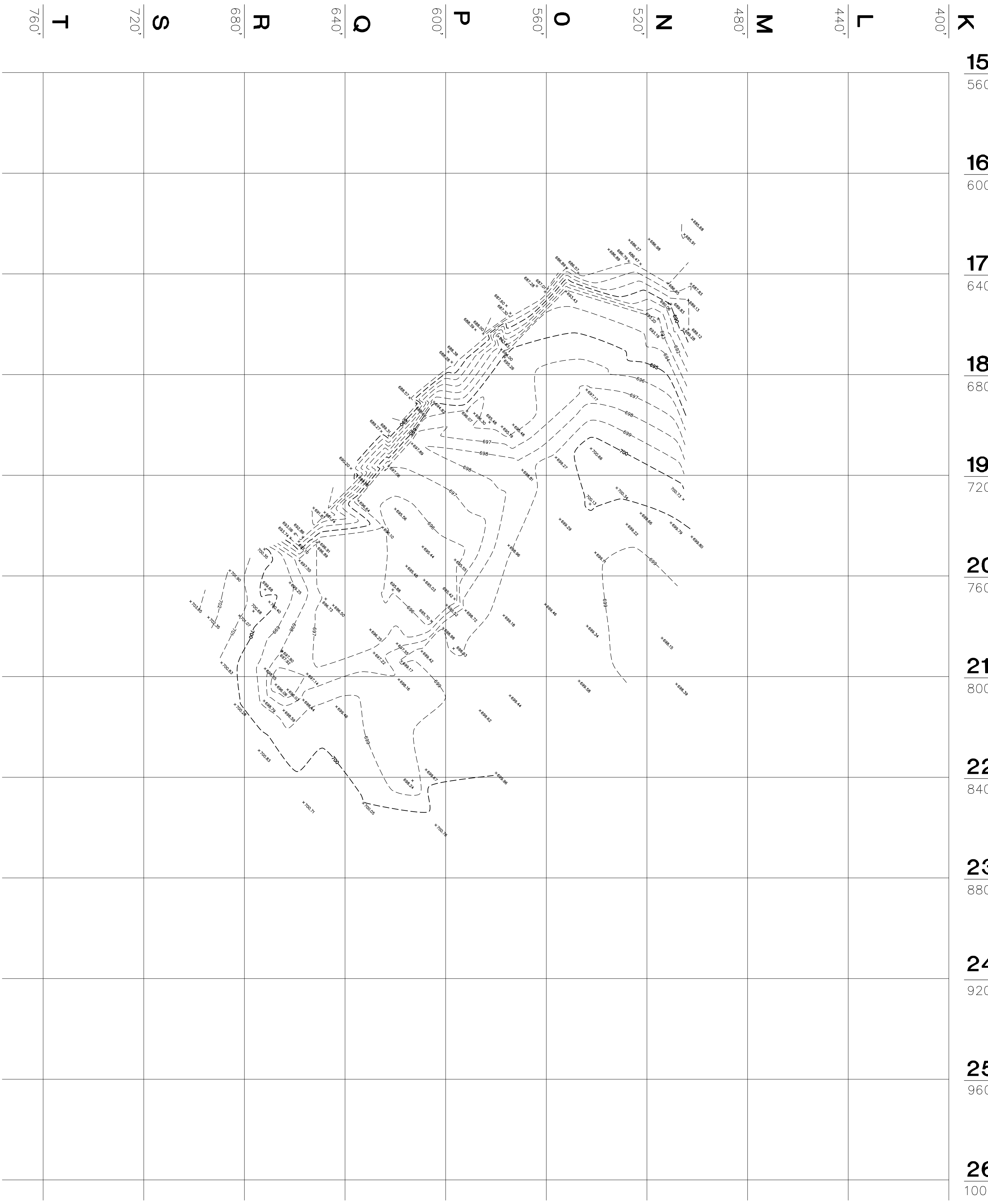
Assumptions:

PZ-35 ASTM A572 Grade 60

Thickness	0.5	in
	12.7	mm
Estimated failure point (% corroded)	30	percent
Rate of corrosion, uncoated, low end	0.05	mm/yr
Rate of corrosion, uncoated, high end	0.13	mm/yr
Rate of corrosion, coated, low end	0.03	mm/yr
Rate of corrosion, coated, high end	0.06	mm/yr
Lifespan, uncoated, low end	29	yr
Lifespan, uncoated, high end	76	yr
Lifespan, coated, low end	64	yr
Lifespan, coated, high end	127	yr

Appendix G
Survey Data

WILCOX PROFESSIONAL SERVICES
(2436TB – 03-19-04)



CERTIFICATION

I, JEREMY R. ROSENBROCK, A PROFESSIONAL SURVEYOR, BEING DULY LICENSED BY THE STATE OF MICHIGAN, DO HEREBY CERTIFY THAT I HAVE CAUSED THE PROPERTY HEREON SHOWN, TO BE SURVEYED AND MAPPED IN ACCORDANCE WITH ALL LOCAL AND STATE ACCEPTED PRACTICES FOR THE ACCURACY OF A SURVEY OF THIS TYPE. I ALSO CERTIFY THAT THE EXISTING CONDITIONS OF THE PROPERTY ARE AS SHOWN HEREON.

JEREMY R. ROSENBROCK, PS #47973 — DATE

CONTROL NOTES

GRID POINT A-1: N. 697801.05 E. 13057328.44
GPS BASEPOINT: N. 696917.38 E. 13057661.26 Z. 730.79

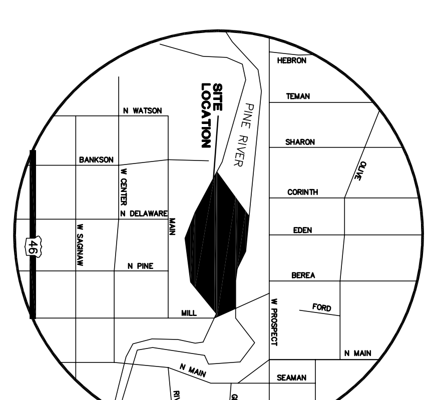
BENCHMARKS

B.M. #1– SET ON SHEET PILING ELEVATION..........724.00
B.M. #2– SW BOLT FOR BRIDGE RAILING @ SW CORNER OF BRIDGE OVER PINE RIVER 500'± UPSTREAM FROM DAM (NOT SHOWN – OFF SUBJECT AREA) ELEVATION..........727.68
B.M. #3– NE CORNER OF CONCRETE FOR WATER FILTRATION UNIT ELEVATION..........731.41

GRAPHIC SCALE
0 10 20 40
(IN FEET)
1 inch = 20 ft.

LOCATION MAP

NOT TO SCALE



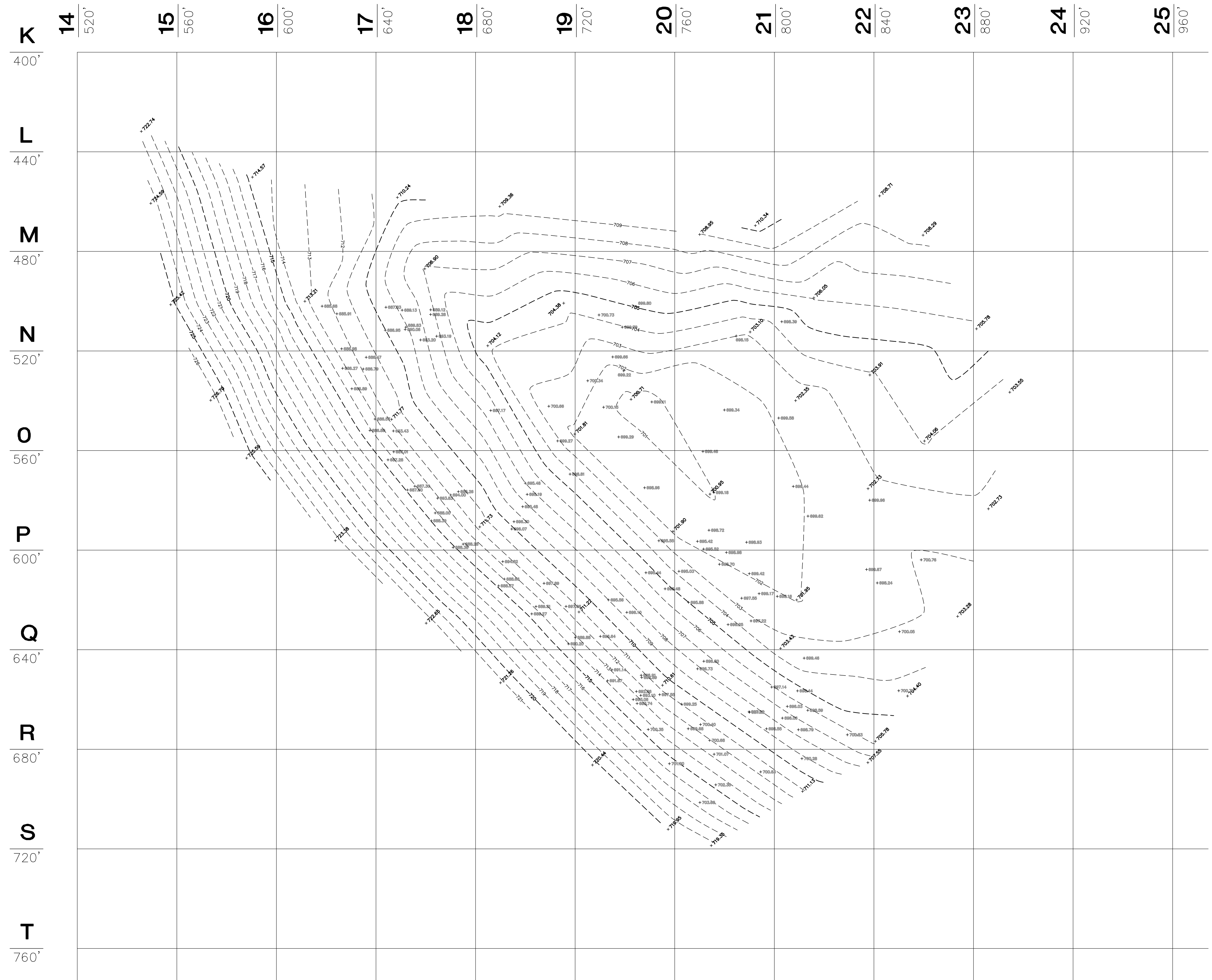
50606.0004	1	Wilcox Professional Services AN ISO 9001 CERTIFIED COMPANY www.wilcoxassociates.com	VELSICOL CHEMICAL PLANT PINE RIVER LOCATION SECTION 24, T.12N., R.3W. PINE RIVER TOWNSHIP GRATIOT COUNTY, MICHIGAN TOPOGRAPHIC SURVEY	NATIONAL ENVIRONMENTAL SERVICES CORPORATION P.O. BOX 300 CLEAR CREEK, INDIANA 47426 (812) 339-9000

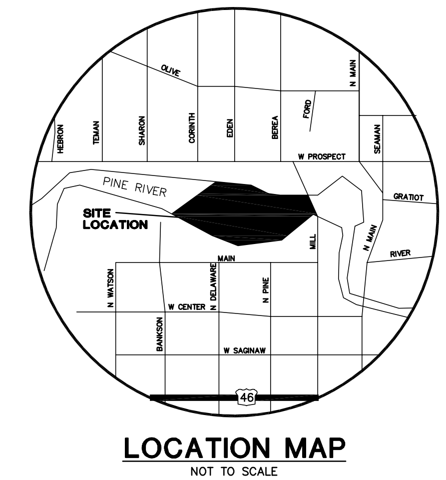
FILE: 50606-04CSUA		PROJECT LOG		PREPARED UNDER THE SUPERVISION OF:
PROJECT MGR: JDM	1	PROJECT START/TOPO OF EQ BASIN	07/07/06	
DESIGNED BY:	2	REVISED	07/17/06	
DRAWN BY: JDT	3			
SCALE: 1"= 20'	4			
	5			
SHEET: 1 OF 1	6			
	7			

P:\Projects\50606\00004\CADD\5060600004\dwg\50606-04CSUB.dwg, 7/27/2006 11:17:10 AM, jthering

 WILCOX PROFESSIONAL SERVICES

(2436TB – 03-19-04)





LOCATION MAP
NOT TO SCALE

GRAPHIC SCALE
0 10 20 40
(IN FEET)
1 inch = 20 ft.

BENCHMARKS

B.M. #1– SET ON SHEET PILING
ELEVATION.............724.00

B.M. #2– SW BOLT FOR BRIDGE RAILING @ SW CORNER OF BRIDGE OVER PINE RIVER 500'± UPSTREAM FROM DAM (NOT SHOWN – OFF SUBJECT AREA)
ELEVATION.............727.68

B.M. #3– NE CORNER OF CONCRETE FOR WATER FILTRATION UNIT
ELEVATION.............731.41

CONTROL NOTES

GRID POINT A–1:	N. 697801.05 E. 13057328.44
GPS BASEPOINT:	N. 696917.38 E. 13057661.26 Z. 730.79

SITE VOLUME

COMPOSITE METHOD:
Current stratum: EQ BASIN VOLUME
Site name = EQ BASIN
Cut = 0 yards Fill = 8683 yards
Net = 8683 yards FILL

SECTION METHOD:
Current stratum: EQ BASIN VOLUME
Site name = EQ BASIN
Passing through sections determining the strata conditions...
Station: 3+74
Displaying strata report for stratum: EQ BASIN VOLUME
Cut: 0 yards Fill: 8686 yards
Net: 8686 yards (FILL)

× 702.73 POST–EXCAVATION SHOT (TAKEN ON 7/24/06)
+ 700.71 PRE–EXCAVATION SHOT (TAKEN ON 7/07/06)

PREPARED UNDER THE SUPERVISION OF:

FILE: 50606–04CSUB	PROJECT LOG	
PROJECT MGR: JDM	1 PROJECT START/TOPO OF EQ BASIN	07/07/06
DESIGNED BY:	2 REVISED	07/17/06
DRAWN BY: JDT	3 POST–EXCAVATION TOPO OF CELL	07/24/06
SCALE: 1"= 20'	4	
	5	
SHEET: 1 OF 1	6	
	7	

NATIONAL ENVIRONMENTAL SERVICES CORPORATION
P.O. BOX 300
CLEAR CREEK, INDIANA 47426
(812) 339-9000

VELSICOL CHEMICAL PLANT PINE RIVER LOCATION

SECTION 24, T.12N., R.3W.
PINE RIVER TOWNSHIP
GRATIOT COUNTY, MICHIGAN

TOPOGRAPHIC SURVEY

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Appendix H

Data Validation Summary Memoranda

Velsicol Pine River 2006 Air Monitoring – Data Quality Evaluation Report

PREPARED FOR:	Gina Bayer/MKE
PREPARED BY:	Shane Lowe/STL
COPIES:	Rob Stryker/MKE Heather Hodach/MKE
DATE:	August 18, 2006

Introduction

The objective of this Data Quality Evaluation (DQE) report is to assess the data quality of analytical results for the air samples collected from the Velsicol-Pine River site May 12, 2006 through July 14, 2006. Individual method requirements and guidelines from the USEPA Contract Laboratory National Functional Guidelines (NFG) for Organic Data Review, October 1999 were used in this assessment.

This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 109 air samples, 5 field duplicates and 5 ambient blank samples. The sample results were reported as 35 sample delivery groups listed in Table 1. Samples were analyzed for one or more of the methods listed in Table 2. The analyses were performed by Air Toxics Laboratory (ATOX) located in Folsom, California.

The assessment of data includes a review of: (1) the chain-of-custody (CoC) documentation; (2) holding-time compliance; (3) the required quality control (QC) samples at the specified frequencies; (4) method blanks; (5) laboratory control spiking samples; (6) surrogate spike recoveries and other method-specific criteria.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of the ambient blanks.

Data flags were assigned according to the NFG. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags used in this assessment are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Table 1

Air Sample SDGs

0605323A
0605323B
0605324B
0605396A
0605396B
0605410A
0605410B
0605414A
0605414B
0605460A
0605460B
0605486A
0605486B
0605544A
0605544B
0605629A
0605629B
0605630A
0605630B
0606016A
0606016B
0606153A
0606153B
0606154
0606330A
0606330B
0606479A
0606479B
0606636A
0606636B
0606694
0607137A
0607137B
0607332A
0607332B

Table 2

Analytical Parameter, Method and Laboratory

Parameter	Method	Laboratory
Volatile Organic Compounds (VOC)	EPA TO-14A	ATOX
Total Suspended Particulates	TSP	ATOX

- R = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte cannot be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation findings are contained in the following sections below and summarized in Table 3.

Holding Times/ Temperature

All holding-time criteria were met.

Calibration

Initial and continuing calibration analyses were performed as required by the methods and generally met acceptance criteria with the exception of the VOC analysis by TO-14A. The recoveries of 2-hexanone, 4-methyl-2-pentanone and bromodichloromethane were less than method criteria in several of the VOC continuing calibration verifications. These analytes were qualified as estimated non-detects and flagged "UJ" in the associated samples. Several analytes were also recovered greater than method criteria in the continuing calibration verifications. The associated data was not qualified because the samples did not contain reportable concentrations of these analytes.

Method Blanks

Method blanks were analyzed at the required frequency and were generally free of contamination with the exception of a TSP analysis where the method blank contained detectable levels of TSP less than the reporting limit. The associated data were not qualified because the sample concentrations were greater than 5 times the concentration detected in the blank.

Ambient Blanks

Ambient blanks were collected and analyzed and were free of contamination.

Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required and met QC criteria with the exception of several analytes in the VOC analyses. Vinyl chloride and 4-methyl-2-pentanone were recovered less than laboratory control limits in several LCS's. The associated sample results were qualified as estimated nondetects and flagged "UJ".

Field Duplicates

Field duplicates were collected and analyzed as required and generally met all acceptance and precision criteria. There are a few instances where the relative percent difference (RPD) was greater than 20% and the associated data were qualified as estimated detects and nondetects and flagged "J" and "UJ" in their respective field duplicate pair.

Surrogates

Surrogates were added to the methods requiring their use and met all QC criteria.

Chain of Custody

Each sample was documented in a completed CoC and received at the laboratory in good condition. There were a few instances where the sample tags and the CoC documentation did not match in regards to sample identification. The discrepancy was noted and the CoC documentation was used to process and report the samples.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The procedures for assessing the precision, accuracy, representativeness, completeness, and comparability parameters (PARCC) were based on the USEPA Contract Laboratory National Functional Guidelines (NFG) for Organic Data Review, October 1999. The following summary highlights the PARCC findings for the above-defined events:

1. The completeness objectives were met for all method/analyte combinations.
2. Calibration criteria were not met in several instances resulting in estimated nondetects. Data qualified as estimated may contain a bias that data users should consider during decision making.
3. LCS recoveries were generally acceptable but there are several instances where data are qualified as estimated and may contain a low bias. Data users should consider the impact to any result that may contain a bias in decisionmaking.
4. There were a few minor instances of precision outliers in the field duplicates, resulting in estimated detects and nondetects.
5. The precision and accuracy of the data, as measured by laboratory and field QC indicators, suggest that the project goals have been met. The data can be used for project decisions taking into consideration the validation flags applied to the data.

Table 3 – Data Qualification Summary

Method	NativeID	Analyte	Units	Final Result	Validation Flag	Validation Reason
TO14A	06CB18-23	4-METHYL-2-PENTANONE	PPBV	0.94	UJ	CCV<LCL
TO14A	06CB18-24	4-METHYL-2-PENTANONE	PPBV	0.98	UJ	CCV<LCL
TO14A	06CB18-25	4-METHYL-2-PENTANONE	PPBV	0.98	UJ	CCV<LCL
TO14A	06CB18-26	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-27	4-METHYL-2-PENTANONE	PPBV	0.98	UJ	CCV<LCL
TO14A	06CB18-41	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-41	2-HEXANONE	PPBV	4.5	UJ	CCV<LCL
TO14A	06CB18-41	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB18-43	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-44	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-45	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TSP	06CB18-45	TOTAL SUSPENDED PARTICULATES	UG/M3	120	J	FD>RPD
TO14A	06CB18-46	4-METHYL-2-PENTANONE	PPBV	1.2	UJ	CCV<LCL
TO14A	06CB18-47	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-48	4-METHYL-2-PENTANONE	PPBV	0.78	UJ	CCV<LCL
TSP	06CB18-49	TOTAL SUSPENDED PARTICULATES	UG/M3	20	J	FD>RPD
TO14A	06CB18-51	BROMODICHLOROMETHANE	PPBV	2.7	UJ	CCV<LCL
TO14A	06CB18-51	2-HEXANONE	PPBV	2.7	UJ	CCV<LCL
TO14A	06CB18-51	4-METHYL-2-PENTANONE	PPBV	0.67	UJ	CCV<LCL
TO14A	06CB18-52	BROMODICHLOROMETHANE	PPBV	4.1	UJ	CCV<LCL
TO14A	06CB18-52	4-METHYL-2-PENTANONE	PPBV	1	UJ	CCV<LCL
TO14A	06CB18-52	2-HEXANONE	PPBV	4.1	UJ	CCV<LCL
TO14A	06CB18-53	BROMODICHLOROMETHANE	PPBV	3.7	UJ	CCV<LCL
TO14A	06CB18-53	2-HEXANONE	PPBV	3.7	UJ	CCV<LCL
TO14A	06CB18-53	4-METHYL-2-PENTANONE	PPBV	0.94	UJ	CCV<LCL
TO14A	06CB18-54	4-METHYL-2-PENTANONE	PPBV	0.72	UJ	CCV<LCL
TO14A	06CB18-55	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-55	2-HEXANONE	PPBV	4.3	UJ	CCV<LCL
TO14A	06CB18-55	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB18-56	4-METHYL-2-PENTANONE	PPBV	1	UJ	CCV<LCL
TO14A	06CB18-56	2-HEXANONE	PPBV	4.1	UJ	CCV<LCL
TO14A	06CB18-56	4-METHYL-2-PENTANONE	PPBV	1	UJ	LCS<LCL
TO14A	06CB18-57	4-METHYL-2-PENTANONE	PPBV	1	UJ	CCV<LCL
TO14A	06CB18-57	2-HEXANONE	PPBV	4	UJ	CCV<LCL
TO14A	06CB18-57	4-METHYL-2-PENTANONE	PPBV	1	UJ	LCS<LCL
TO14A	06CB18-58	2-HEXANONE	PPBV	2.7	UJ	CCV<LCL
TO14A	06CB18-58	4-METHYL-2-PENTANONE	PPBV	0.67	UJ	CCV<LCL
TO14A	06CB18-58	4-METHYL-2-PENTANONE	PPBV	0.67	UJ	LCS<LCL
TO14A	06CB18-59	2-HEXANONE	PPBV	3.8	UJ	CCV<LCL
TO14A	06CB18-59	4-METHYL-2-PENTANONE	PPBV	0.96	UJ	CCV<LCL
TO14A	06CB18-59	4-METHYL-2-PENTANONE	PPBV	0.96	UJ	LCS<LCL

Table 3 – Data Qualification Summary

Method	NativeID	Analyte	Units	Final Result	Validation Flag	Validation Reason
TO14A	06CB18-60	4-METHYL-2-PENTANONE	PPBV	1	UJ	CCV<LCL
TO14A	06CB18-60	2-HEXANONE	PPBV	4.1	UJ	CCV<LCL
TO14A	06CB18-60	4-METHYL-2-PENTANONE	PPBV	1	UJ	LCS<LCL
TO14A	06CB18-61	4-METHYL-2-PENTANONE	PPBV	1.2	UJ	CCV<LCL
TO14A	06CB18-61	2-HEXANONE	PPBV	4.7	UJ	CCV<LCL
TO14A	06CB18-61	4-METHYL-2-PENTANONE	PPBV	1.2	UJ	LCS<LCL
TO14A	06CB18-62	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	CCV<LCL
TO14A	06CB18-62	2-HEXANONE	PPBV	4.3	UJ	CCV<LCL
TO14A	06CB18-62	4-METHYL-2-PENTANONE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB18-71	CHLOROBENZENE	PPBV	11	J	FD>RPD
TO14A	06CB18-71	2-BUTANONE (METHYL ETHYL KETONE)	PPBV	2.7	J	FD>RPD
TO14A	06CB18-75	CHLOROBENZENE	PPBV	1.1	UJ	FD>RPD
TO14A	06CB18-75	2-BUTANONE (METHYL ETHYL KETONE)	PPBV	1.1	UJ	FD>RPD
TO14A	06CB19-14	VINYL CHLORIDE	PPBV	1.2	UJ	LCS<LCL
TO14A	06CB19-15	VINYL CHLORIDE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB19-16	VINYL CHLORIDE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB19-17	VINYL CHLORIDE	PPBV	1.1	UJ	LCS<LCL
TO14A	06CB19-62	CARBON DISULFIDE	PPBV	1.1	UJ	FD>RPD
TO14A	06CB19-66	CARBON DISULFIDE	PPBV	4	J	FD>RPD

Notes:
CCV<LCL The continuing calibration verification recovery was less than method criteria.
LCS<LCL The laboratory control standard recovery was less than control limits.
FD>RPD The relative percent difference was greater than method criteria.

Velsicol Pine River 2006 Sediment Samples- Data Quality Evaluation Report

PREPARED FOR: Gina Bayer/MKE

PREPARED BY: Heather Hodach/MKE

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DATE: December 28, 2006

Introduction

The objective of this Data Quality Evaluation (DQE) report is to assess the data quality of analytical results for the sediment samples collected from the Velsicol-Pine River site June 7, 2006 through June 25, 2006. Individual method requirements and guidelines from the USEPA Contract Laboratory National Functional Guidelines (NFG) for Organic Data Review, October 1999 were used in this assessment.

This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 50 stablized sediment samples. The sample results were reported as 7 sample delivery groups listed in Table 1.

TABLE 1
Sediment Sample SDGs

Sediment Sample SDGs
2504043
2504099
2504148
2504160
2504192
2504210

Samples were analyzed for one or more of the methods listed in Table 2 below. The analyses were performed by PEL Laboratories, Inc. (PEL) located in Tampa, Florida.

TABLE 2
Analytical Parameter, Method and Laboratory

Parameter	Method	Laboratory
2,4'-DDx and 4,4'-DDx isomers	SW-846 8081	PEL
Hexabromobenzene & Hexabromobiphenyl	SW-846 8082	PEL

The assessment of data includes a review of the following: (1) the chain-of-custody (CoC) documentation; (2) holding-time compliance; (3) the required quality control (QC) samples at the specified frequencies; (4) method blanks; (5) laboratory control spiking samples; (6) surrogate spike recoveries and other method-specific criteria.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of the ambient blanks.

Data flags were assigned according to the NFG. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts on data quality.

The data flags used in this assessment are defined below:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

The overall summaries of the data validation findings are contained in the following sections below and summarized in Table 3 below:

Holding Times/ Temperature

All holding-time criteria were met.

Calibration

Initial and continuing calibration analyses were performed as required by the methods and generally met acceptance criteria with the exception of the pesticide analysis by SW-846 8081. The relative percent difference of 2,4'-DDE in SDG 2504210 was 26.2%, which exceeds the QC limit of $\pm$20%. The relative percent difference of 4,4'-DDT in SDG 2504099 was 25.9%, which exceeds the QC limit of $\pm$20%. These analytes were qualified as estimated and flagged "J" for detects and "UJ" for non-detects in the associated samples. Several analytes were also recovered greater than method criteria in the continuing calibration verifications. The associated data was not qualified because the samples did not contain reportable concentrations of these analytes.

Method Blanks

Method blanks were analyzed at the required frequency and did not contain levels of contamination that affected the data. The associated data were not qualified because the sample concentrations were greater than 5 times any concentration detected in the blanks.

Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required and met QC criteria.

Surrogates

Surrogates were added to the methods requiring their use and met all QC criteria.

Chain of Custody

Each sample was documented in a completed CoC and received at the laboratory in good condition.

Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The procedures for assessing the precision, accuracy, representativeness, completeness, and comparability parameters (PARCC) were based on the USEPA Contract Laboratory National Functional Guidelines (NFG) for Organic Data Review, October 1999. The following summary highlights the PARCC findings for the above-defined events:

1. The completeness objectives were met for all method/analyte combinations.
2. Calibration criteria were not met in several instances resulting in estimated detects and nondetects. Data qualified as estimated may contain a bias that data users should consider during decision making.
3. LCS recoveries were acceptable.
4. The precision and accuracy of the data, as measured by laboratory and field QC indicators, suggest that the project goals have been met. The data can be used for project decisions taking into consideration the validation flags applied to the data.

TABLE 3
Data Qualification Summary

Method	NativeID	Analyte	Units	Final Result	Validation Flag	ValidationReason
8081	06CB19-40	2,4′-DDE	UG/KG	230	UJ	CCV>RPD
8081	06CB19-41	2,4′-DDE	UG/KG	7.3	J	CCV>RPD
8081	05CB18-90	4,4′-DDT	UG/KG	30000	J	CCV>RPD

Notes:
CCV>RPD The continuing calibration verification relative percent difference was greater than method criteria.

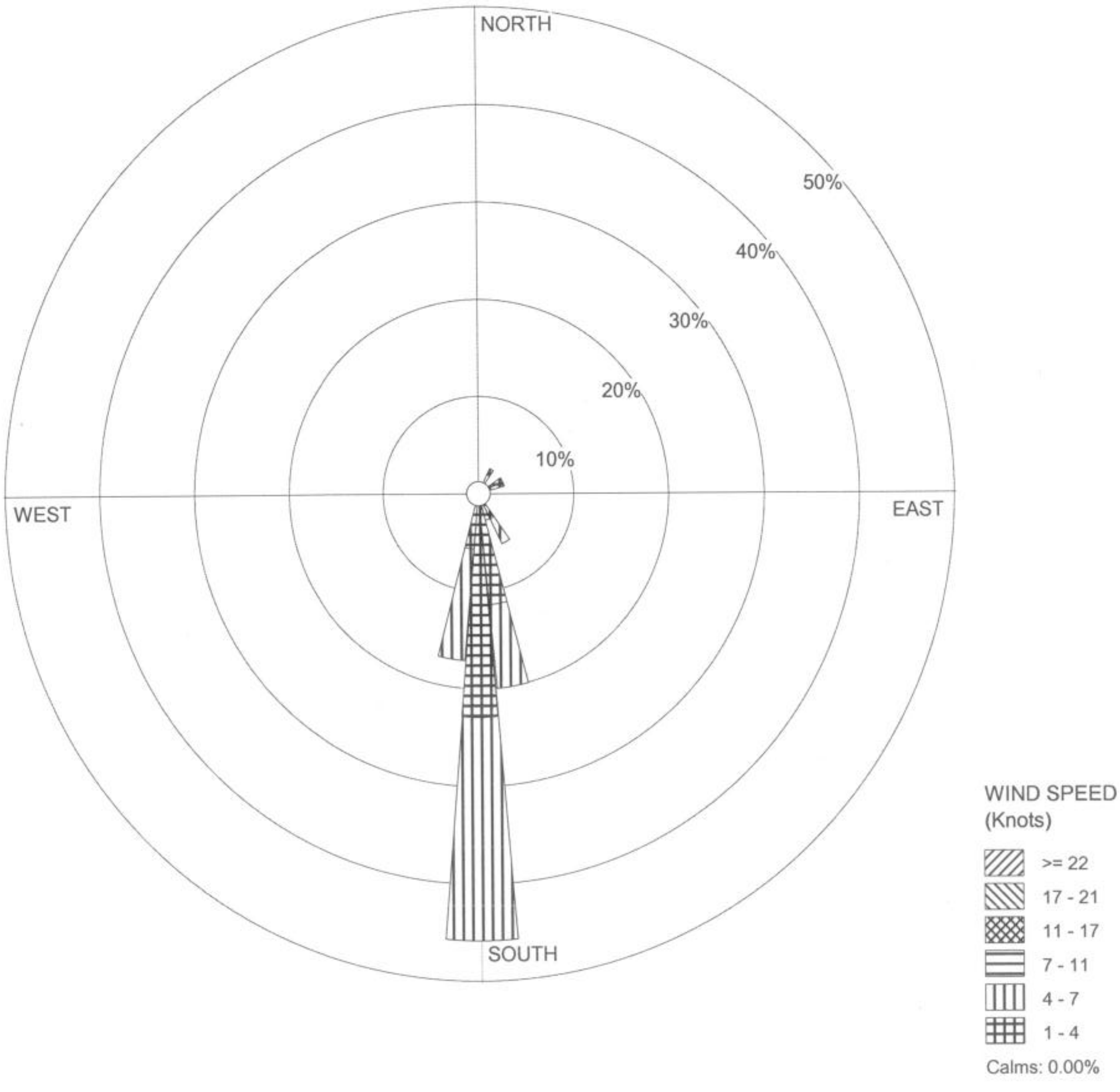
Appendix I
Wind Rose Plots

WIND ROSE PLOT:

Velsicol Pine River
May 10, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:
VOCs	2006 May 10 - May 10 09:00 - 17:00	CH2M HILL
	CALM WINDS: 0.00%	
	AVG. WIND SPEED: 4.01 Knots	PROJECT NO.:

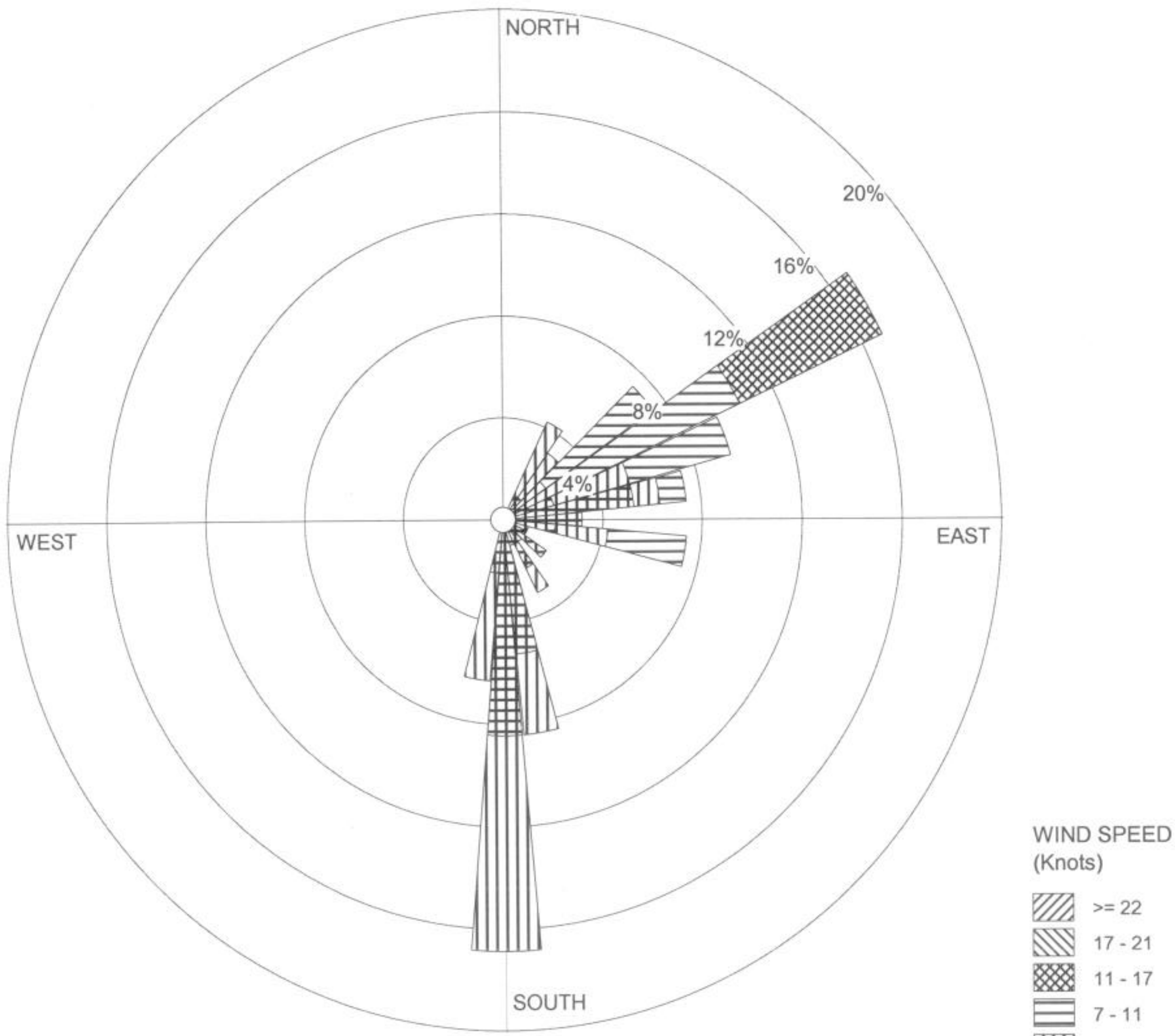
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 10-11, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
May 10 - May 11
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CH2MHILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

5.60 Knots

PROJECT NO.:

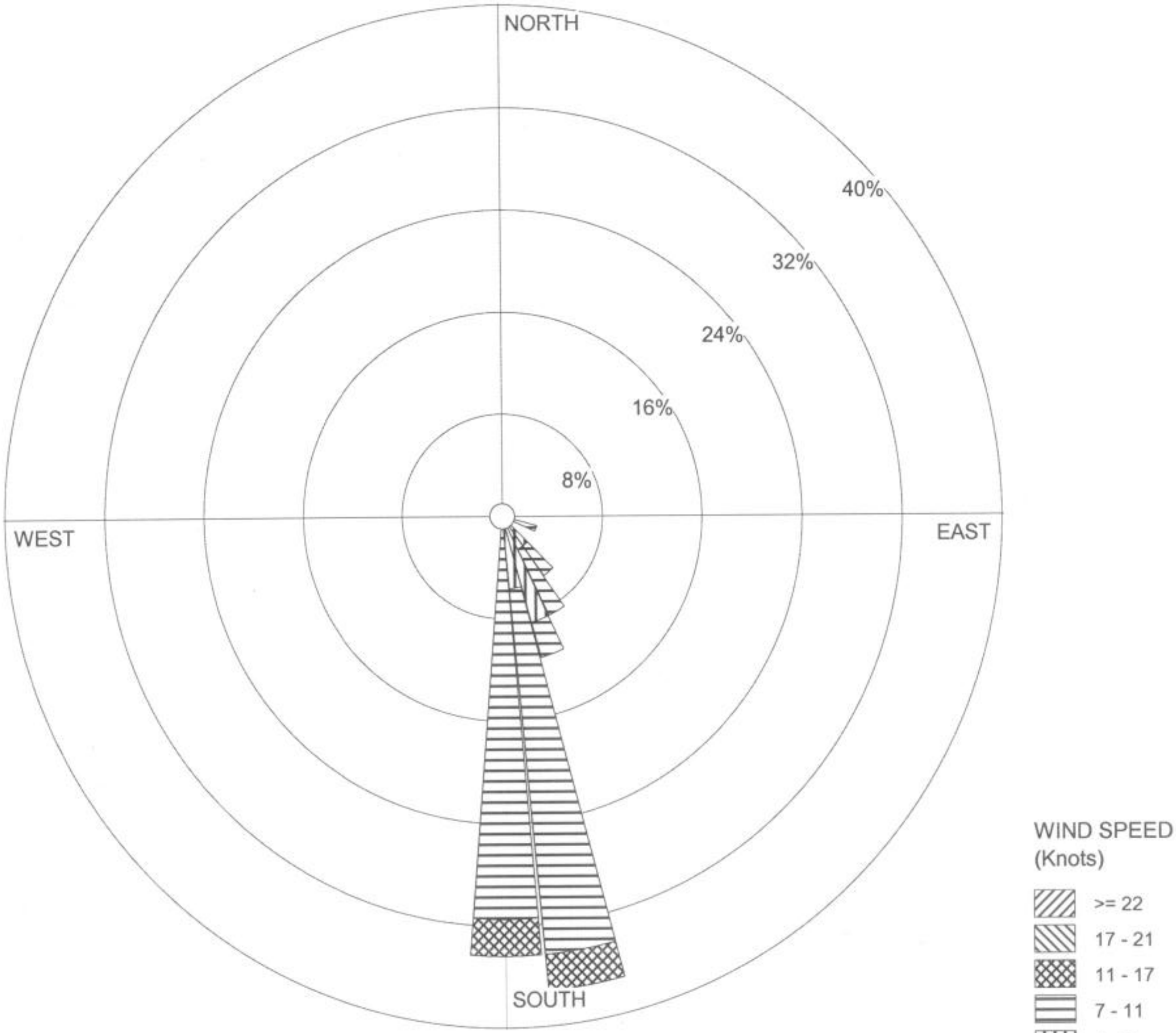
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 11, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
May 11 - May 11
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

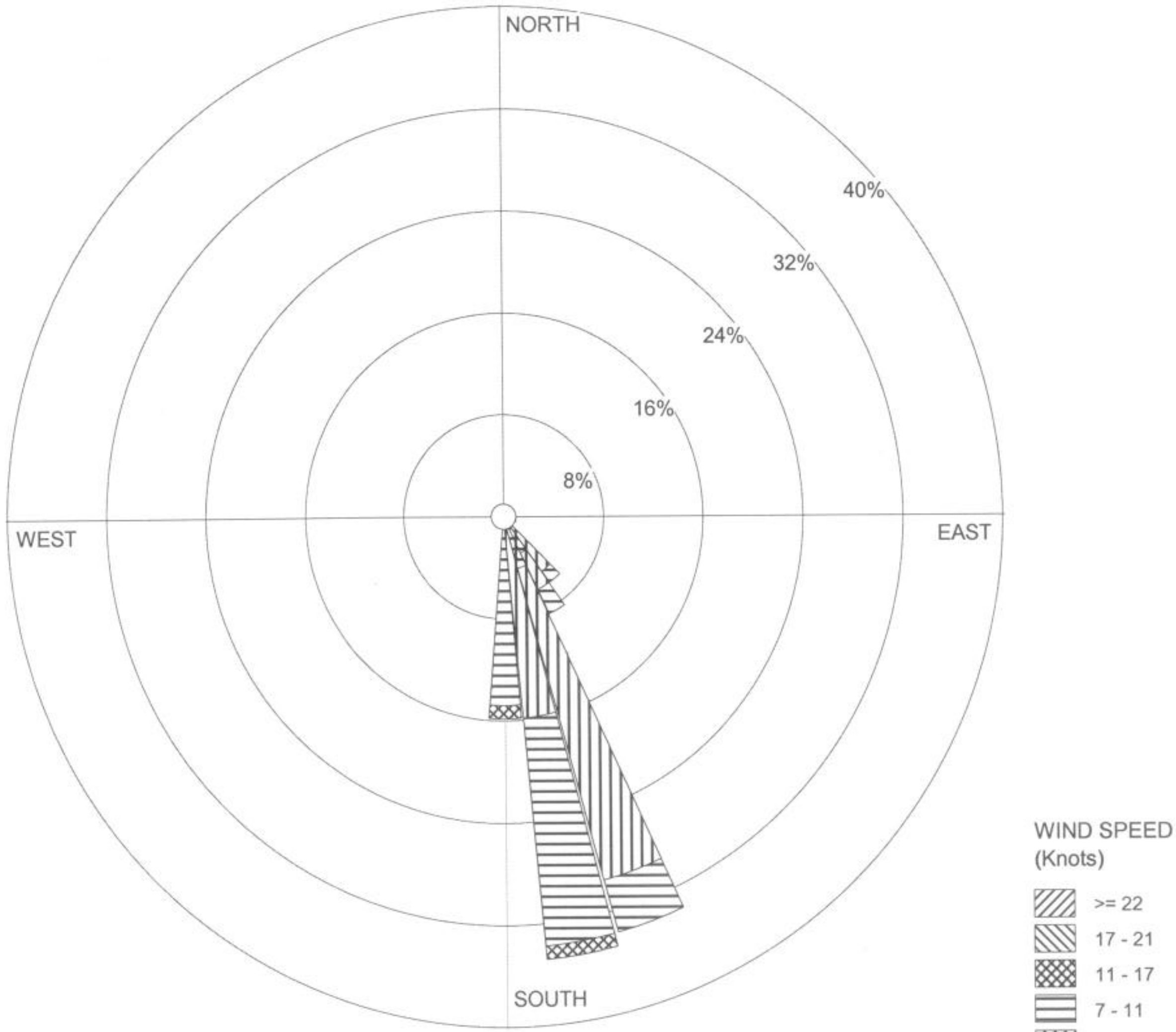
8.68 Knots

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:
Velsicol Pine River
May 11-12, 2006 (24-Hour)

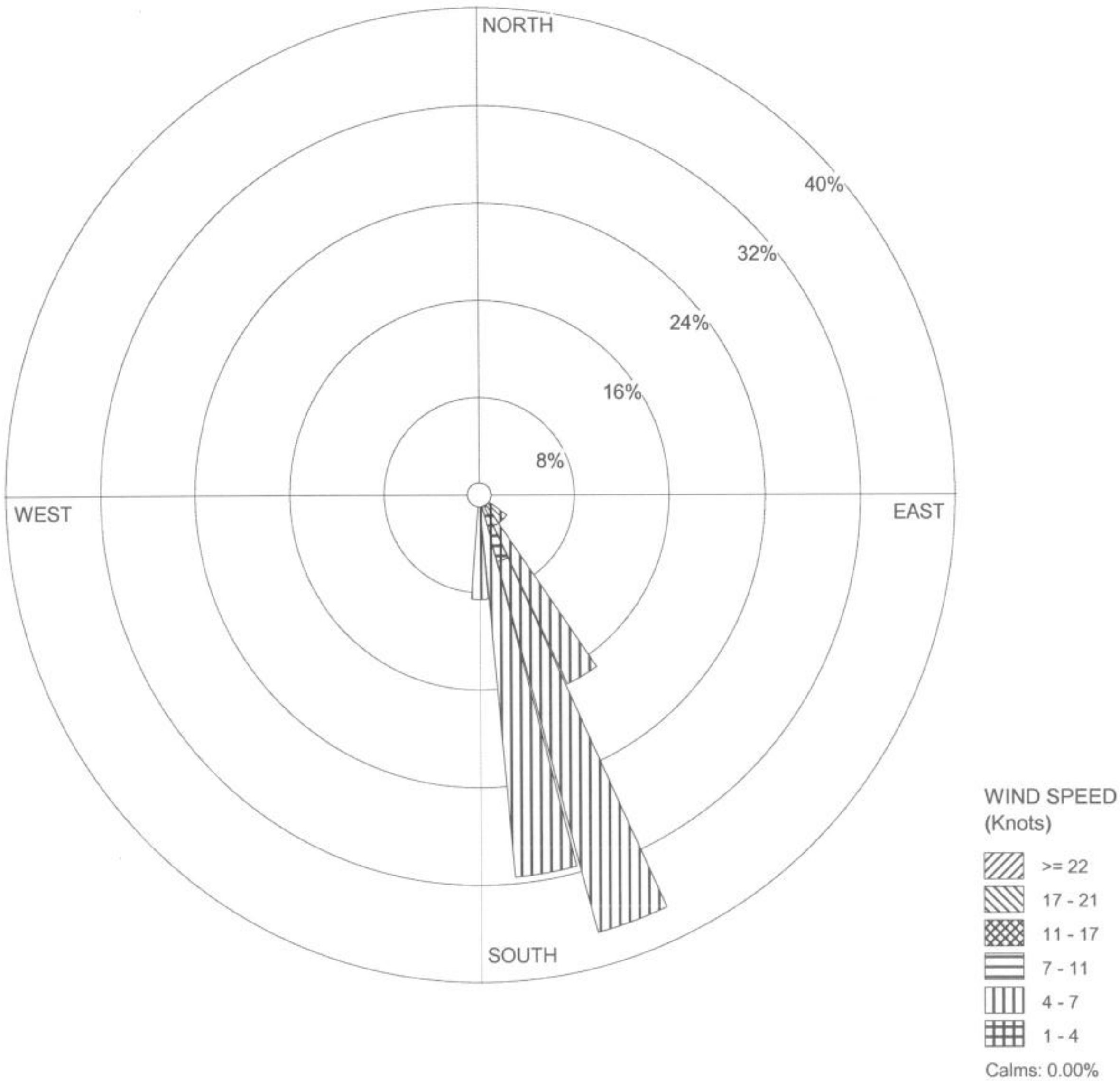
DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:
TSP	**2006** **May 11 - May 12** **00:00 - 23:00**	**CH2M HILL**
	CALM WINDS: **0.00%**	
	AVG. WIND SPEED: **6.90 Knots**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:	DISPLAY:
Velsicol Pine River **May 12, 2006 (8-Hour)**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 12 - May 12** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **5.27 Knots**		PROJECT NO.:

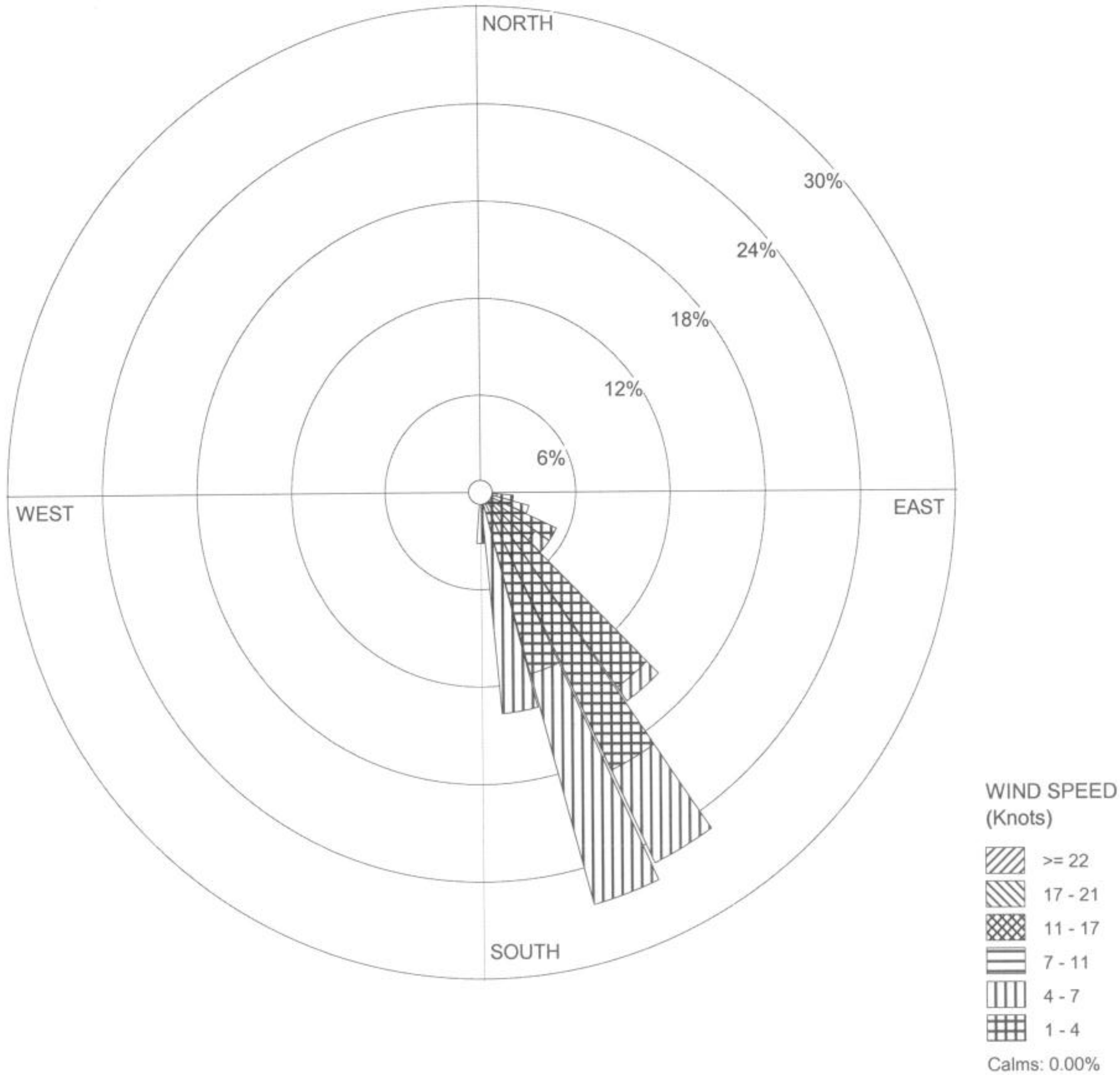
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 12-13, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **May 12 - May 13** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **3.92 Knots**		PROJECT NO.:

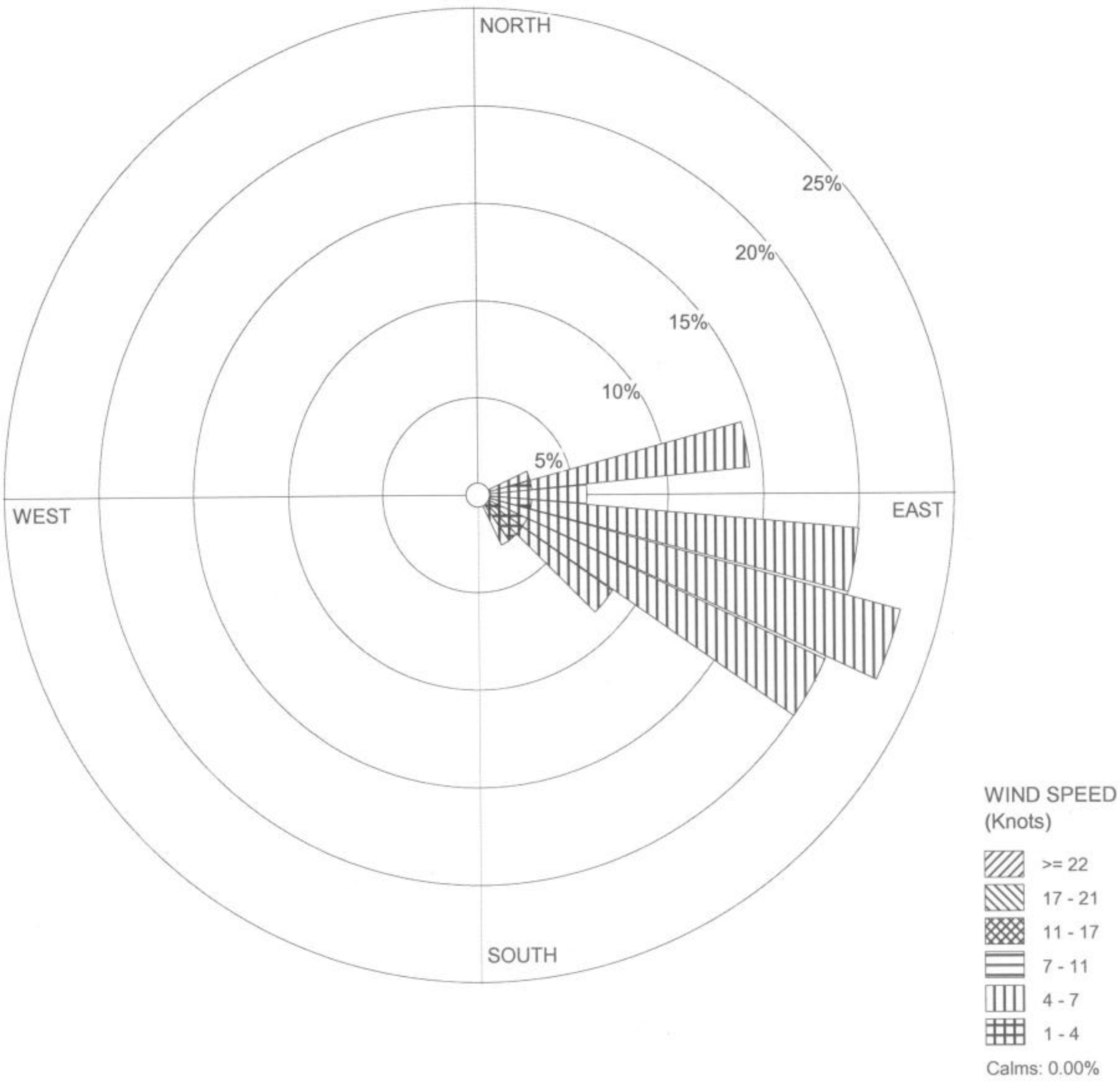
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 13, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 13 - May 13** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		
	AVG. WIND SPEED: **4.71 Knots**		PROJECT NO.:

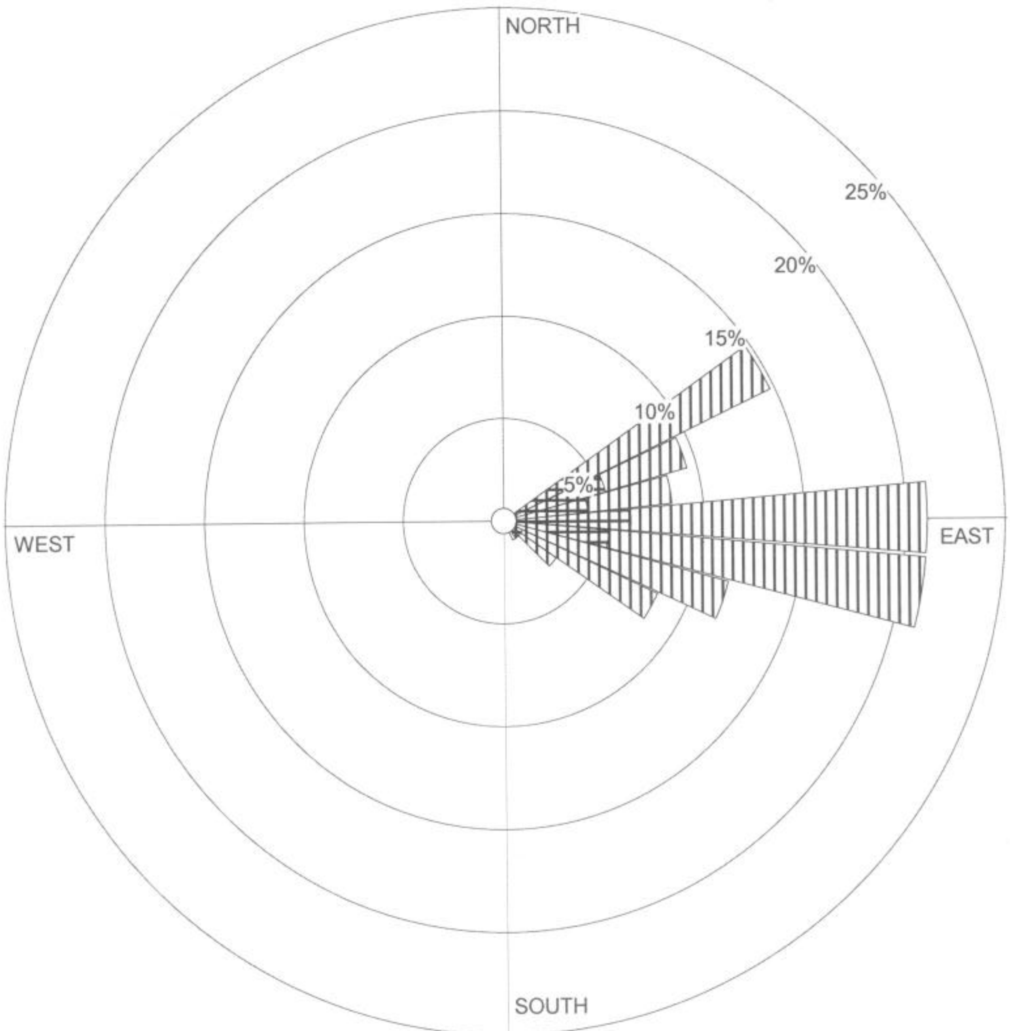
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 13-14, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED (Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 0.00%

COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **May 13 - May 14** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **4.49 Knots**		PROJECT NO.:

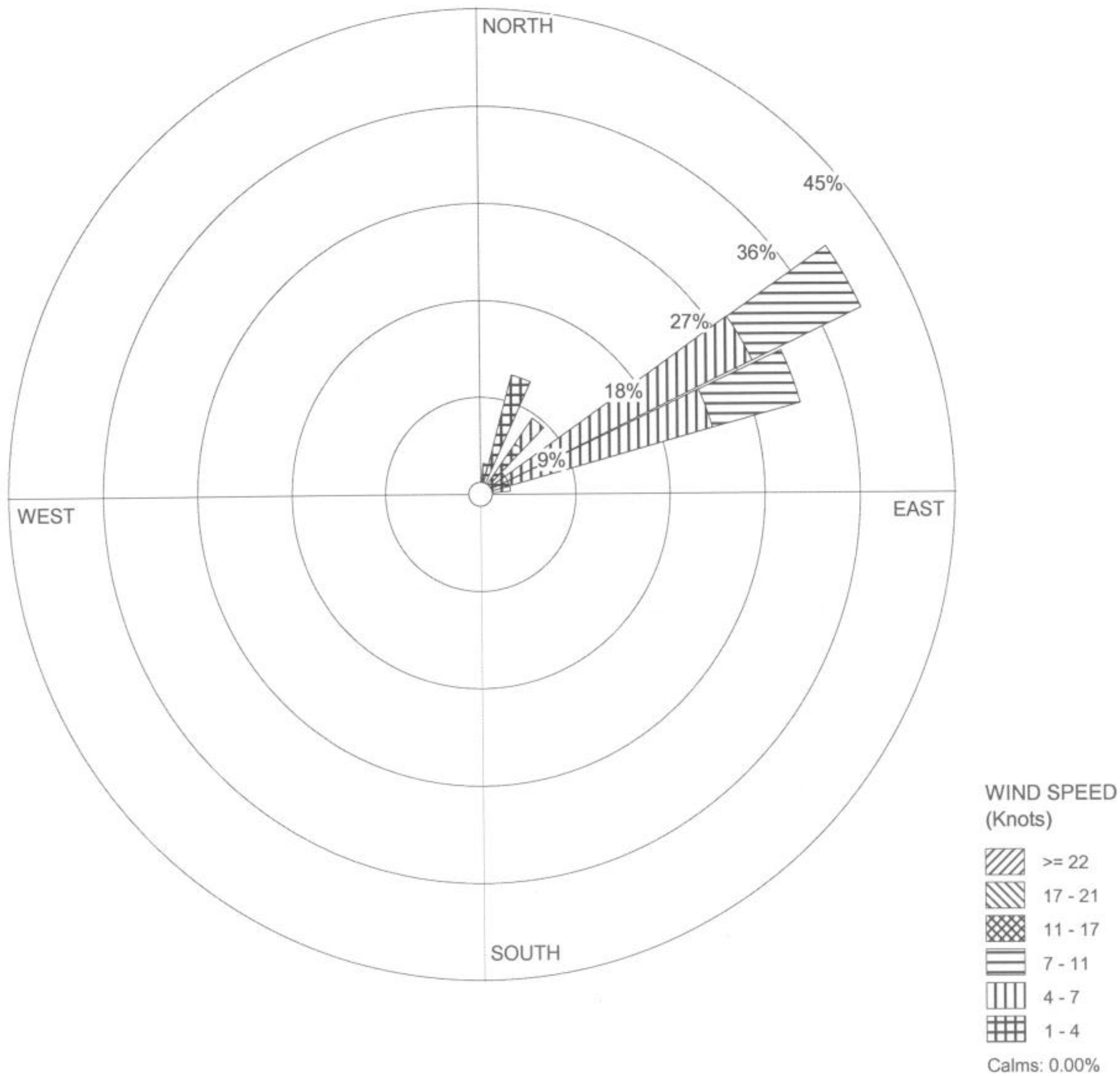
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 14, 2006 (8-Hour)

DISPLAY:

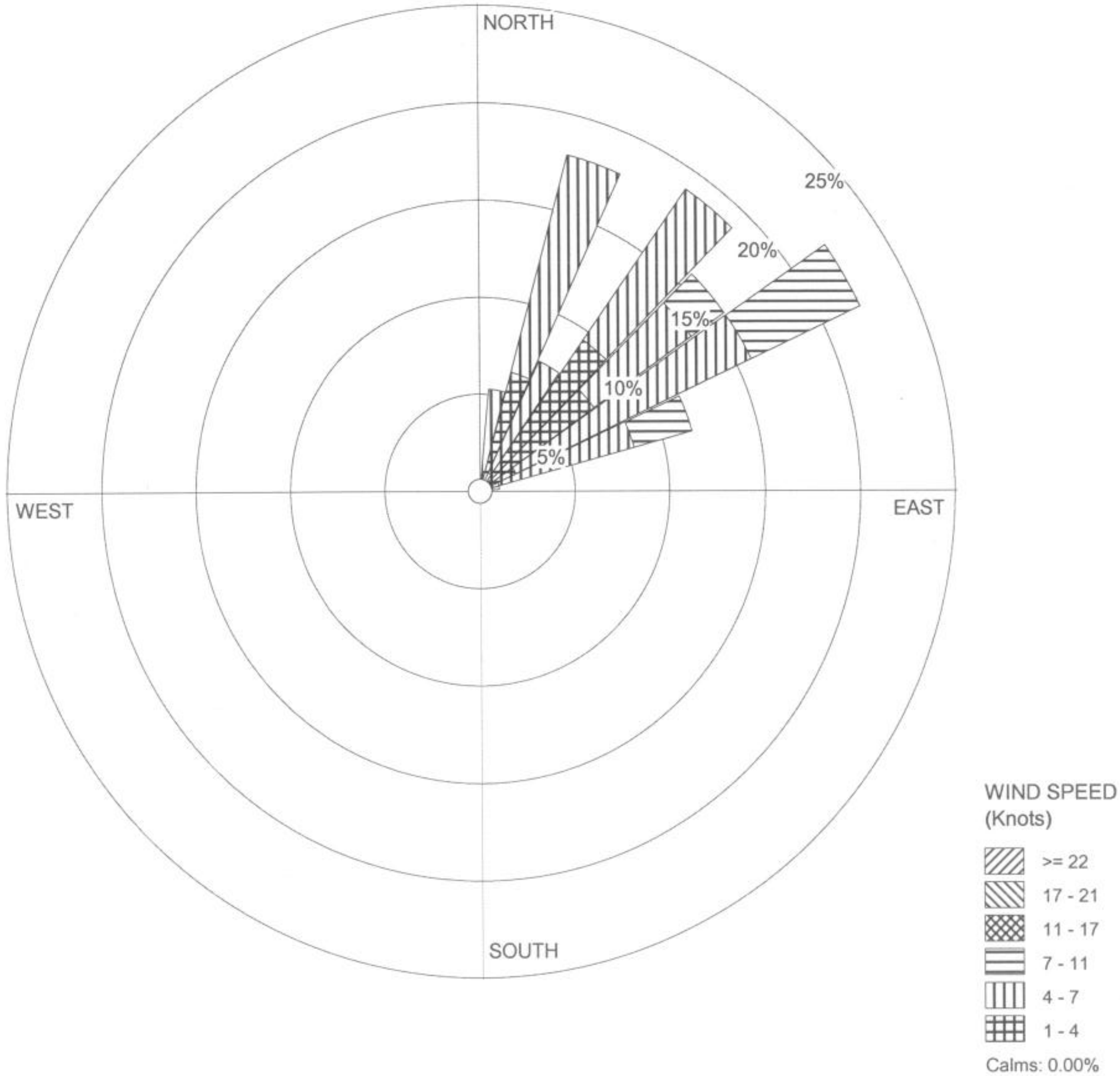
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	2006 May 14 - May 14 09:00 - 17:00	CH2M HILL	
	CALM WINDS: 0.00%		
	AVG. WIND SPEED: 5.49 Knots		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

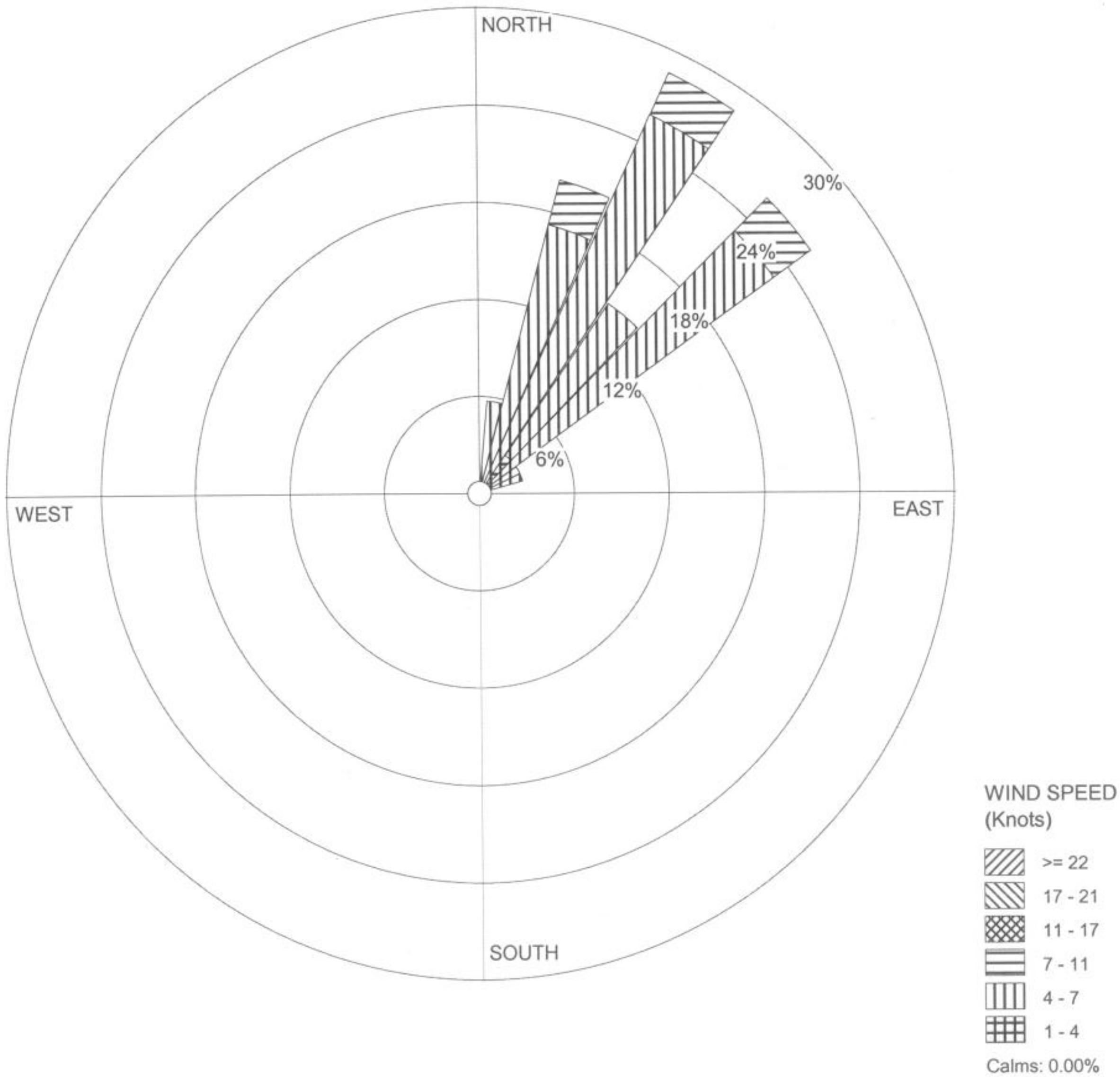
WIND ROSE PLOT: **Velsicol Pine River** **May 14-15, 2006 (24-Hour)**	DISPLAY: **Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:
TSP	**2006** **May 14 - May 15** **00:00 - 23:00**	**CH2M HILL**
	CALM WINDS: **0.00%**	CH2MHILL
	AVG. WIND SPEED: **5.17 Knots**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:	DISPLAY:
Velsicol Pine River **May 15, 2006 (8-Hour)**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 15 - May 15** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **6.03 Knots**		PROJECT NO.:

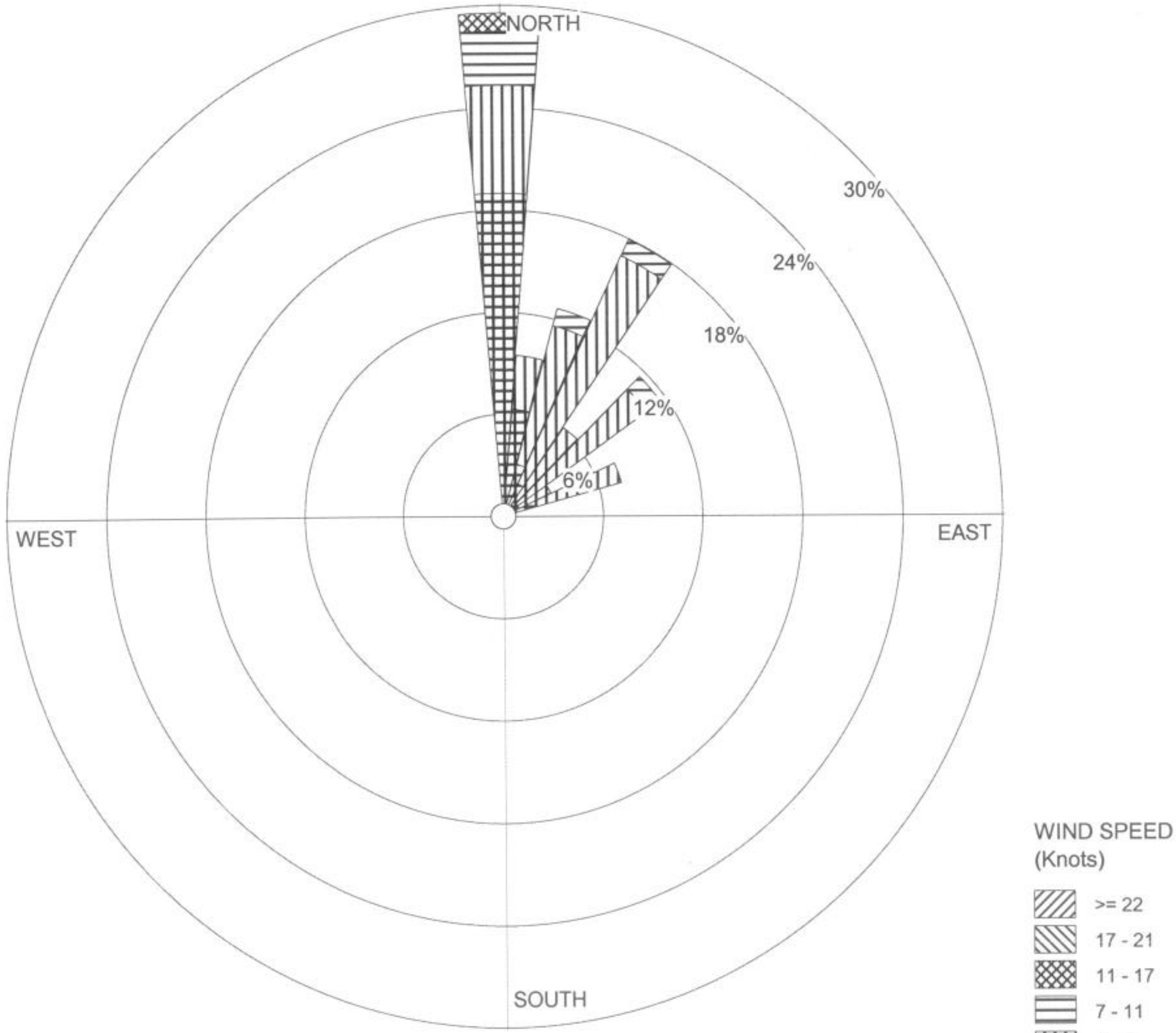
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 15-16, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
May 15 - May 16
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

2.11%

AVG. WIND SPEED:

4.67 Knots

PROJECT NO.:

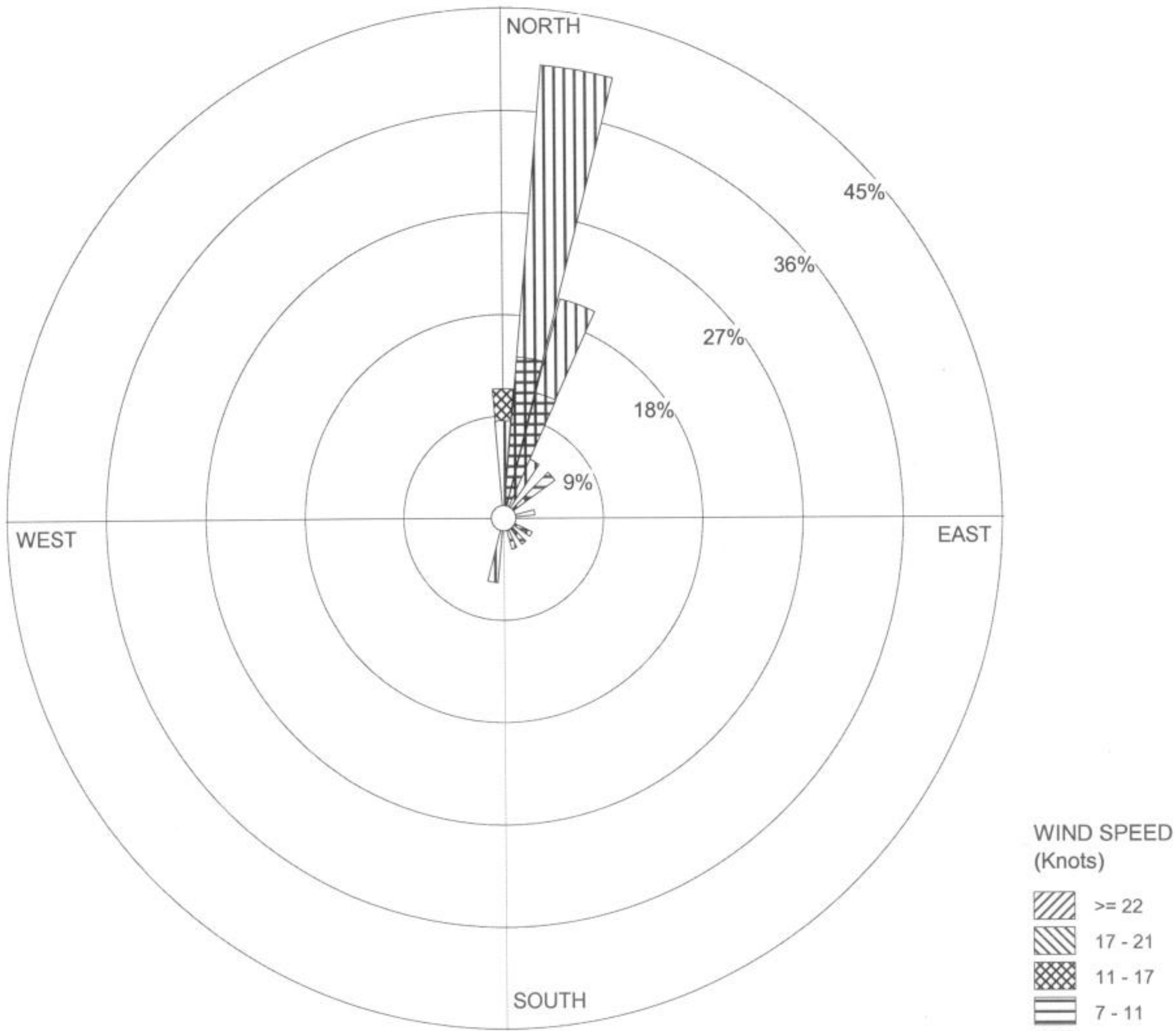
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 16, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 16 - May 16** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **4.84 Knots**		PROJECT NO.:

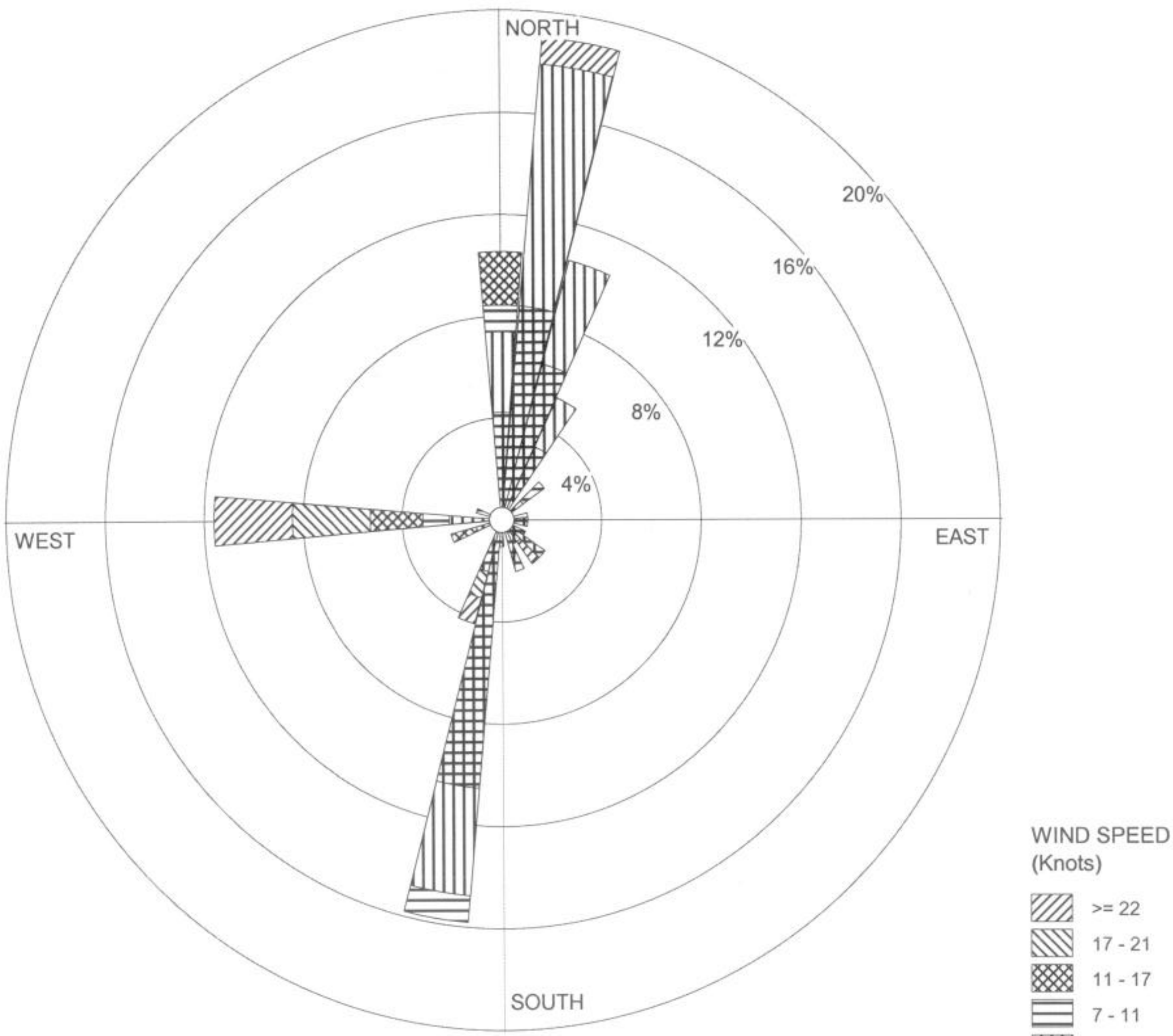
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 16-17, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
May 16 - May 17
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

5.26%

AVG. WIND SPEED:

6.35 Knots

PROJECT NO.:

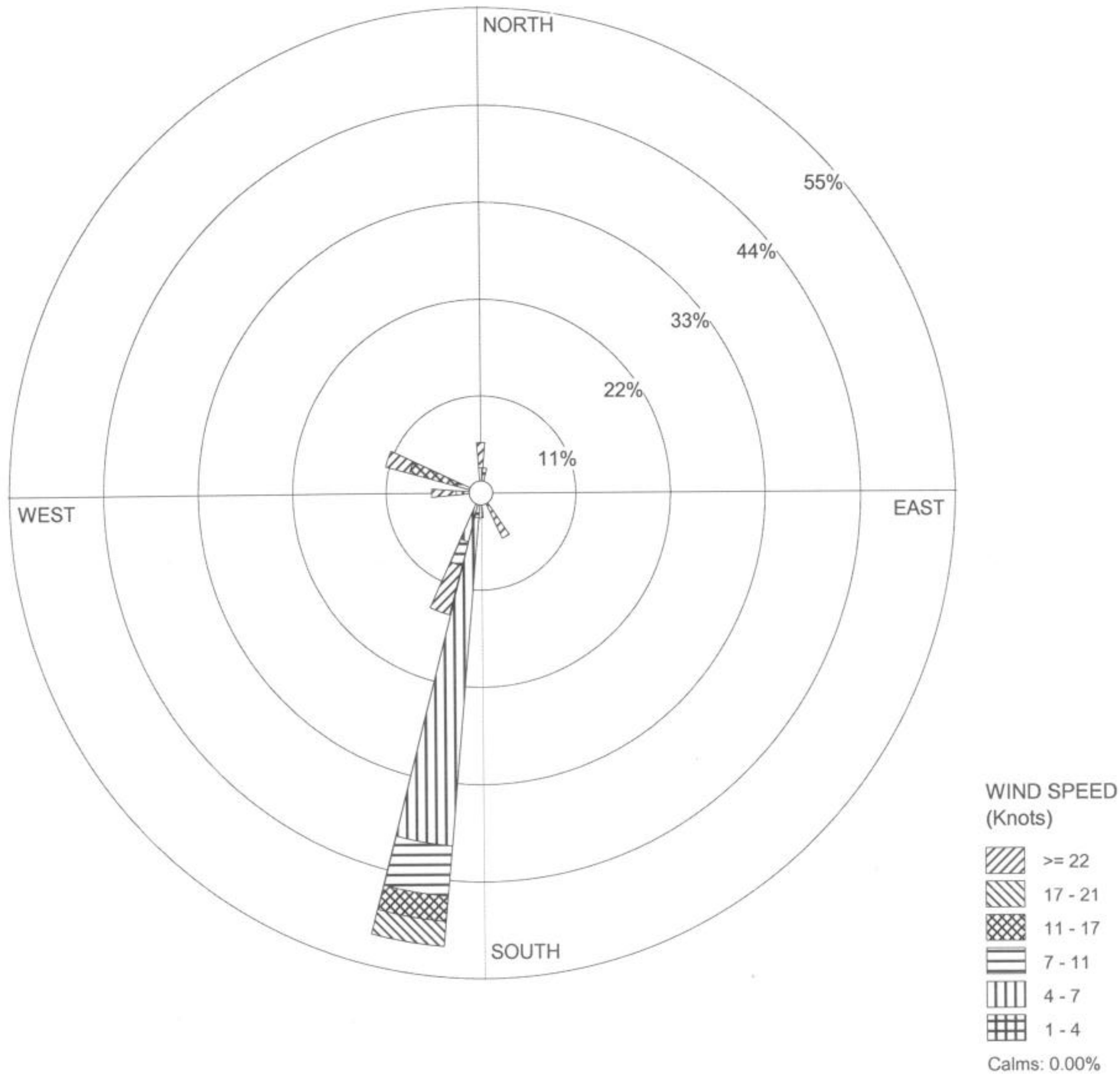
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 17, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:
VOCs	**2006** **May 17 - May 17** **09:00 - 17:00**	**CH2M HILL**
	CALM WINDS: **0.00%**	
	AVG. WIND SPEED: **11.81 Knots**	PROJECT NO.:

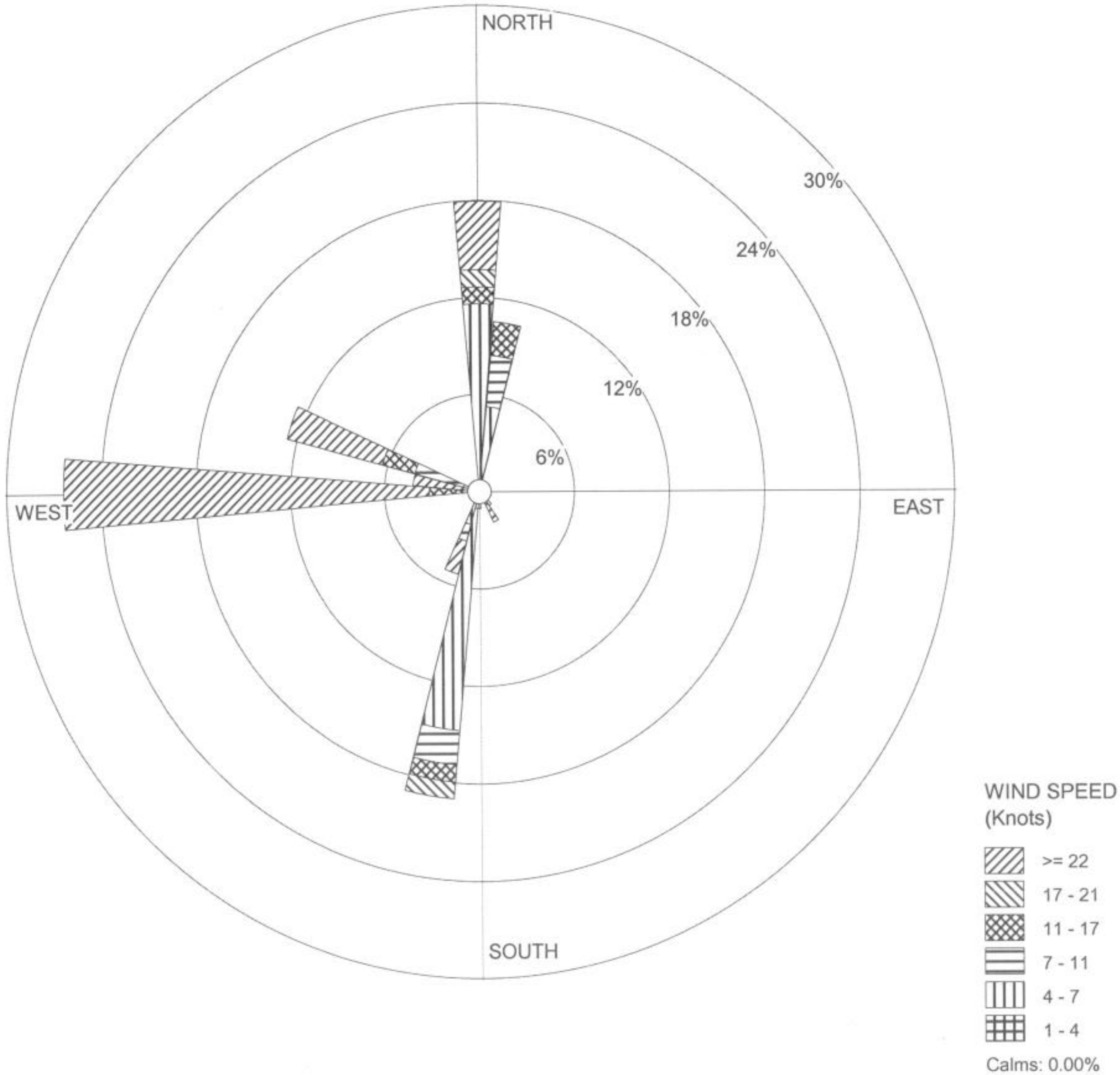
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 17-18, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **May 17 - May 18** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **44.67 Knots**		PROJECT NO.:

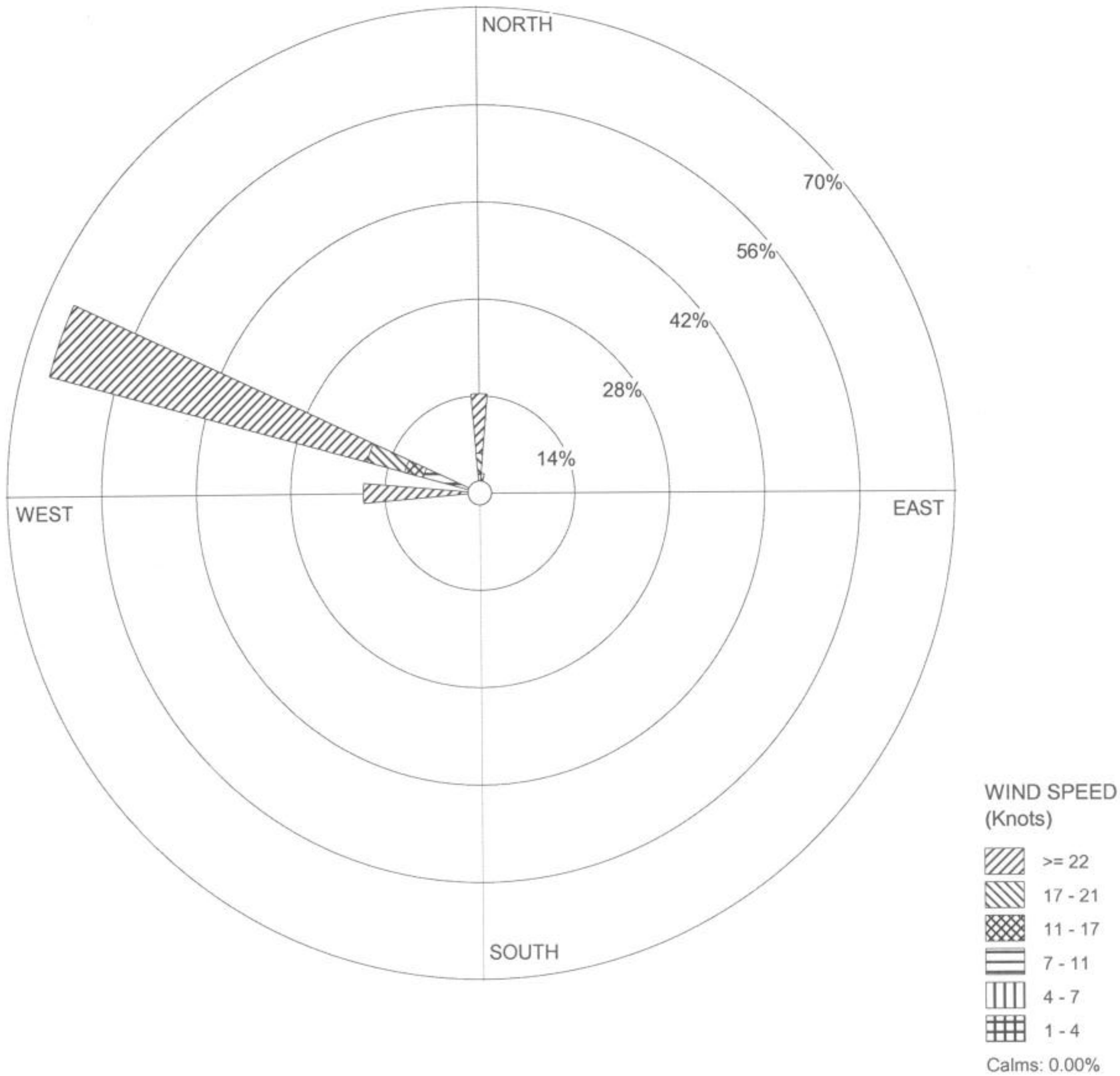
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 18, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 18 - May 18** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **50.90 Knots**		PROJECT NO.:

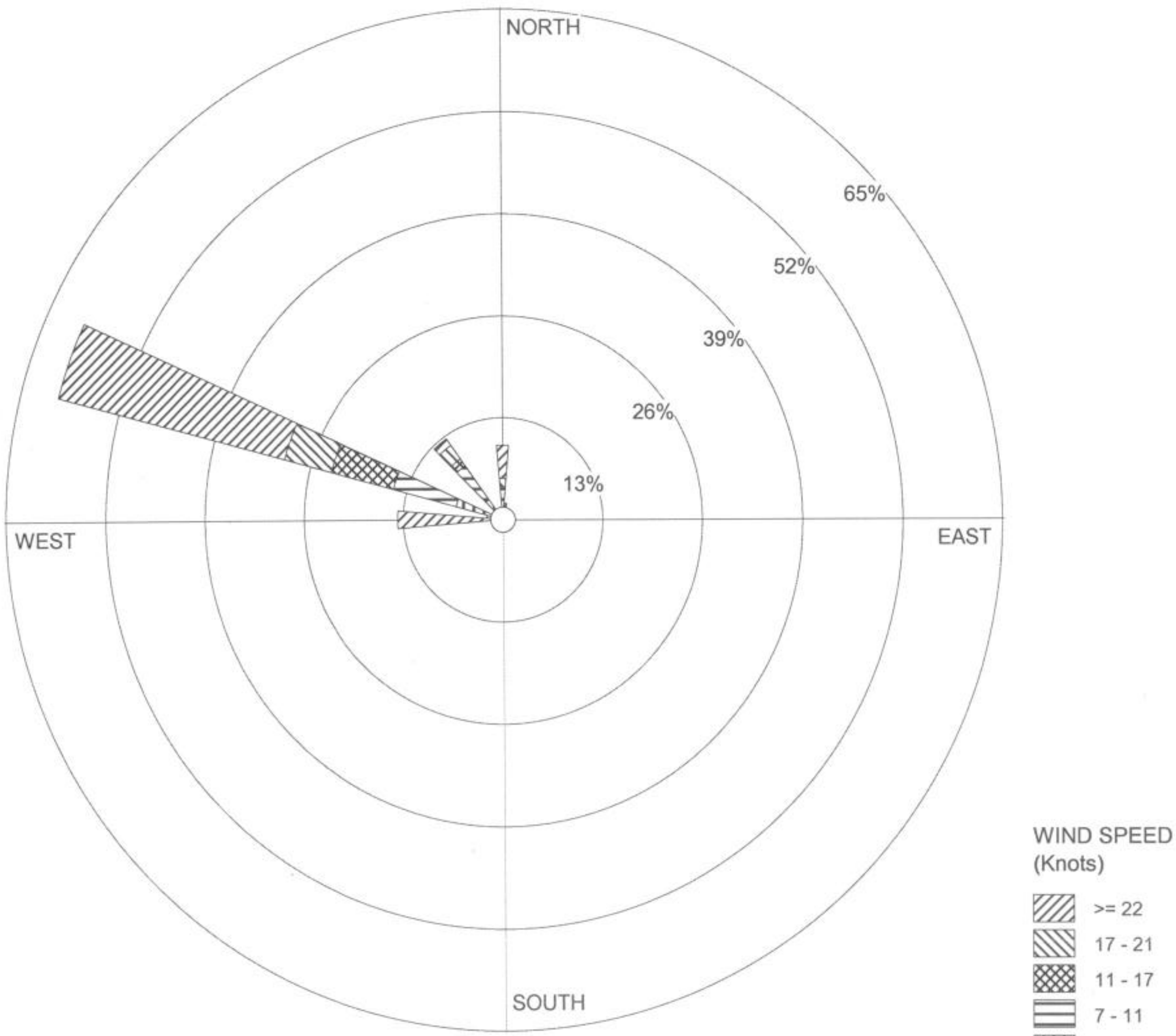
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 18-19, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: TSP	DATA PERIOD: **2006** **May 18 - May 19** **00:00 - 23:00**	COMPANY NAME: **CH2M HILL**
	CALM WINDS: **0.00%**	CH2MHILL
	AVG. WIND SPEED: **43.97 Knots**	PROJECT NO.:

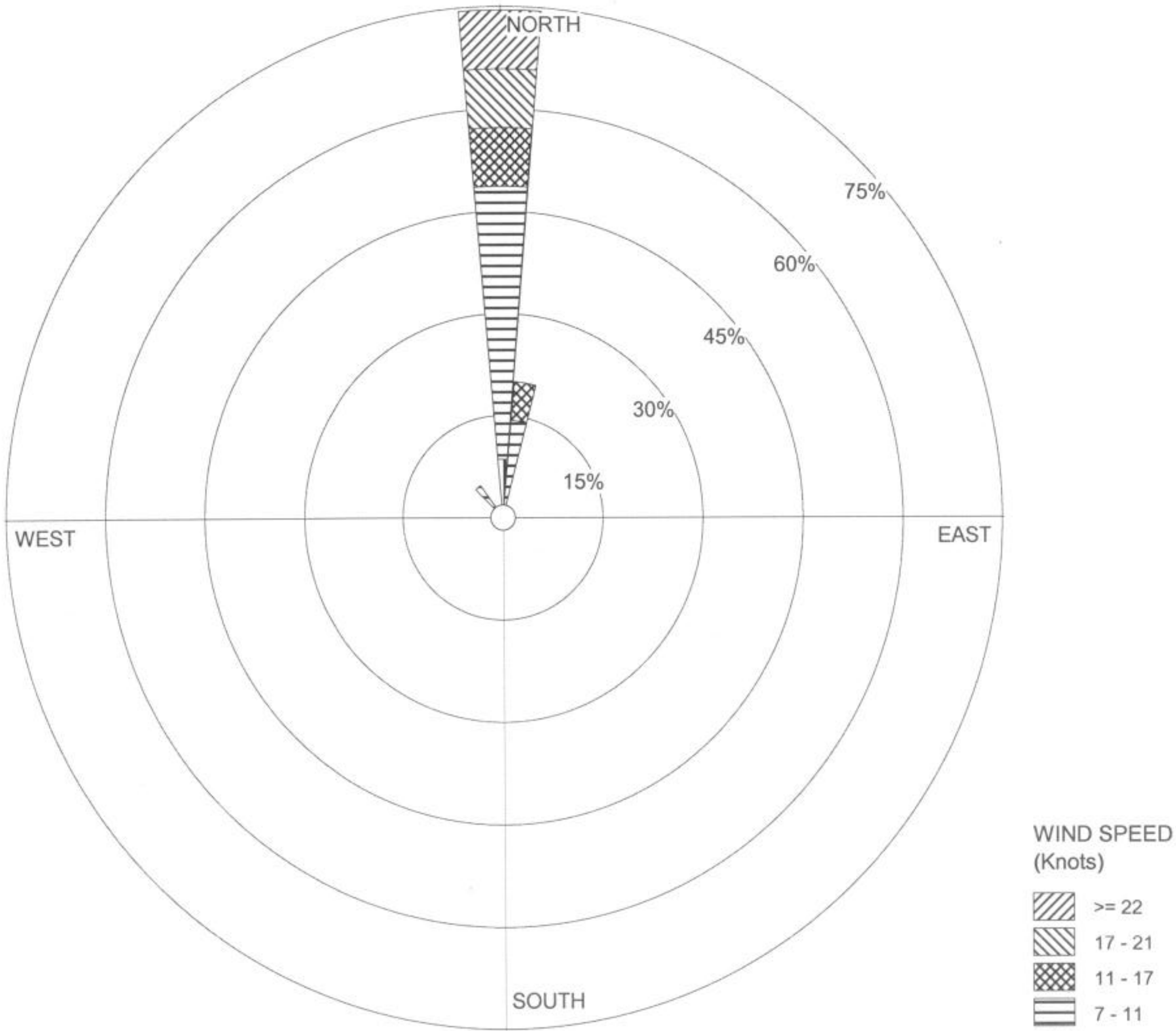
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 19, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 19 - May 19** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **11.71 Knots**		PROJECT NO.:

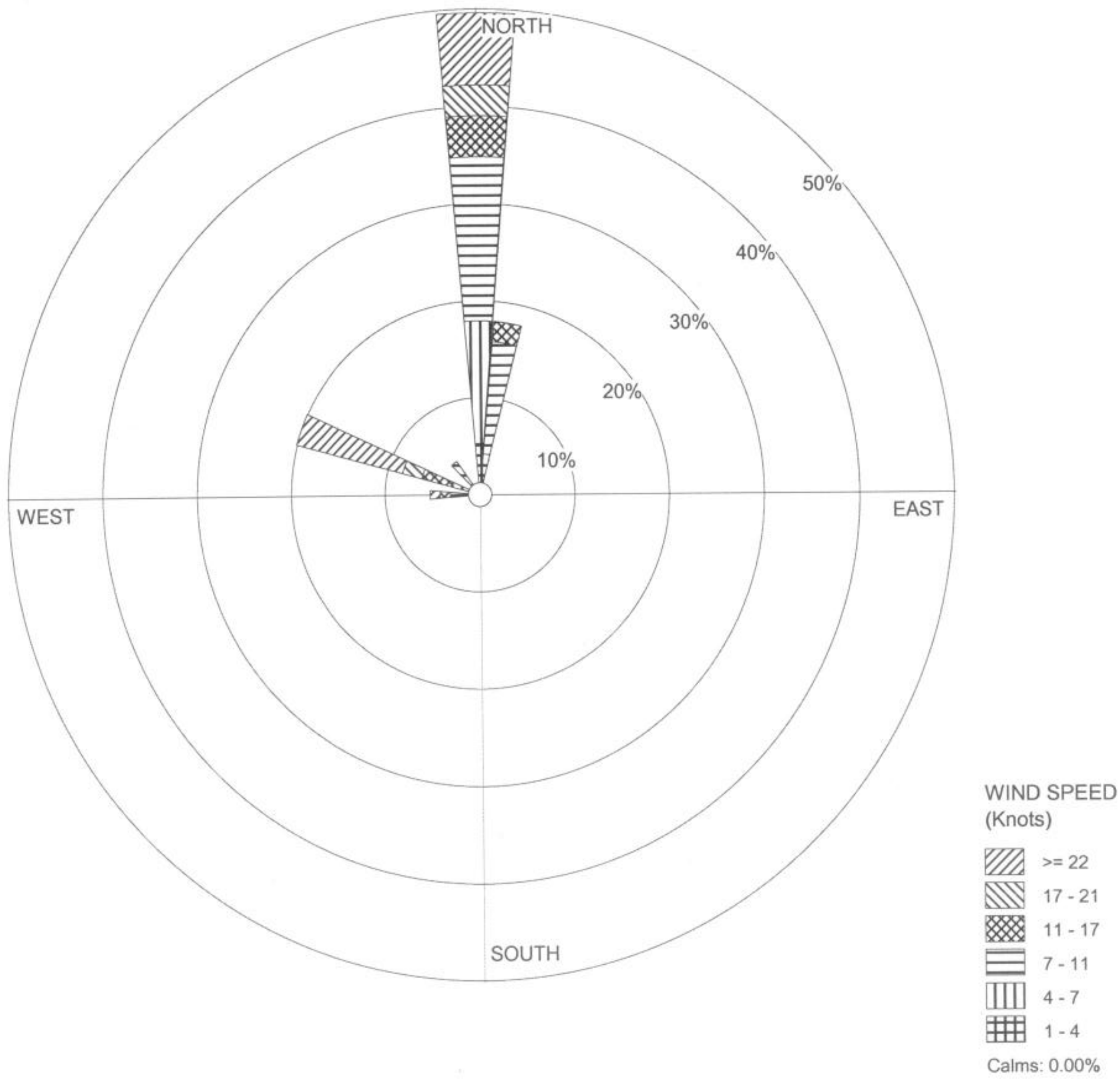
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 19-20, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
May 19 - May 20
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

16.05 Knots

PROJECT NO.:

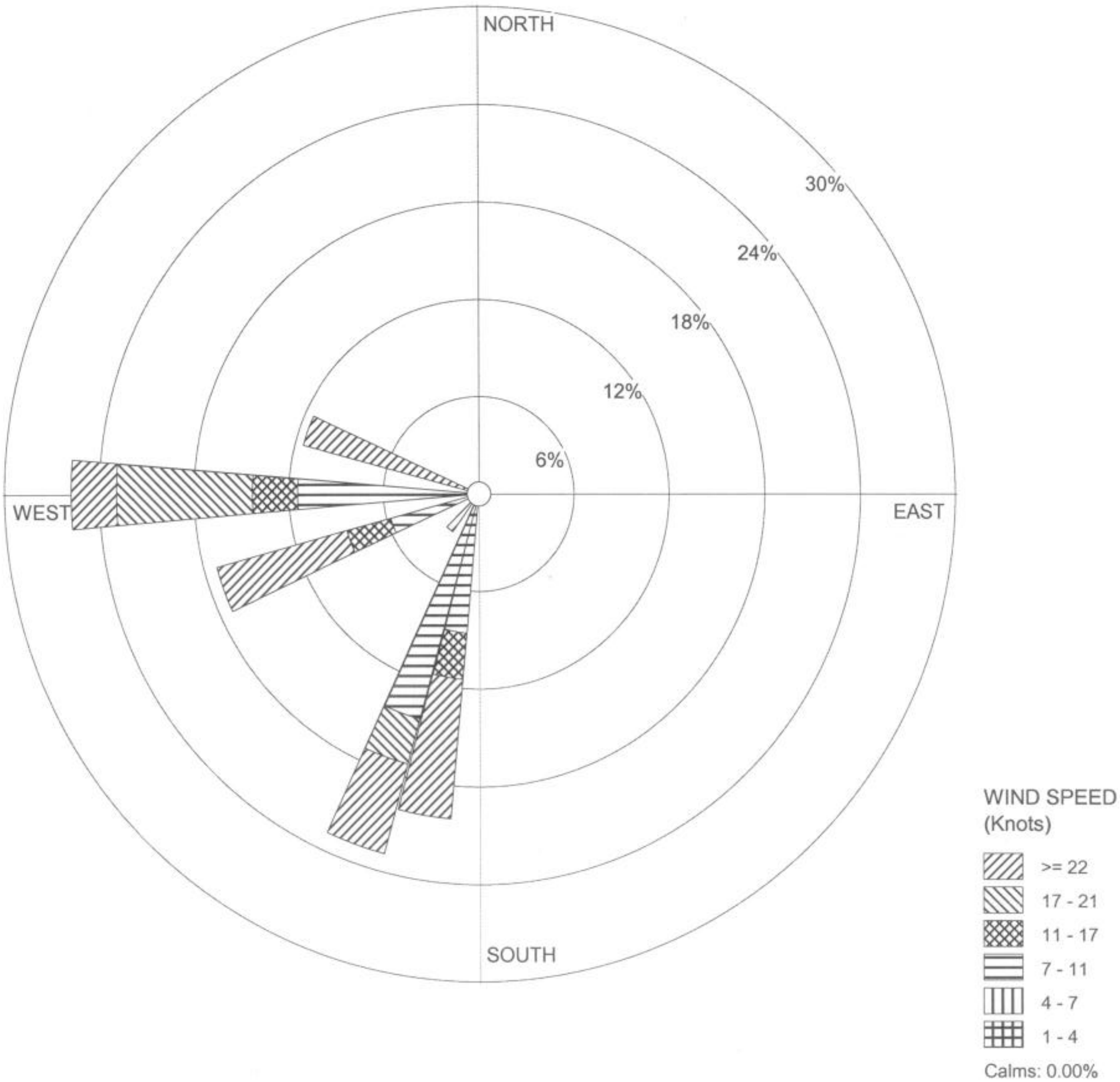
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 20, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: VOCs	DATA PERIOD: **2006** **May 20 - May 20** **09:00 - 17:00**	COMPANY NAME: **CH2M HILL**
	CALM WINDS: **0.00%**	CH2MHILL
	AVG. WIND SPEED: **25.80 Knots**	PROJECT NO.:

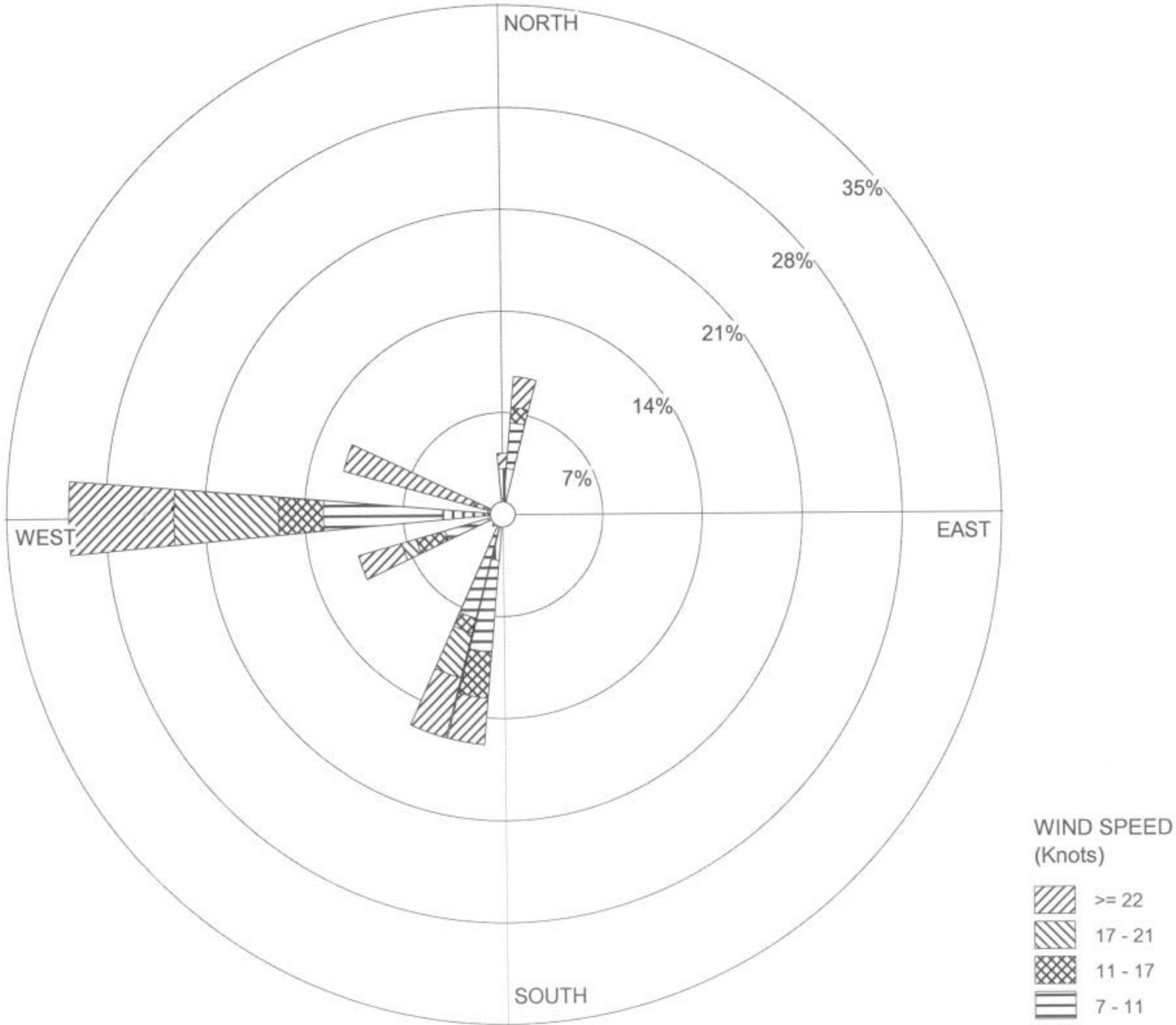
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 20-21, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: TSP	DATA PERIOD: **2006** **May 20 - May 21** **00:00 - 23:00**	COMPANY NAME: **CH2M HILL**
	CALM WINDS: **0.00%**	CH2MHILL
	AVG. WIND SPEED: **21.14 Knots**	PROJECT NO.:

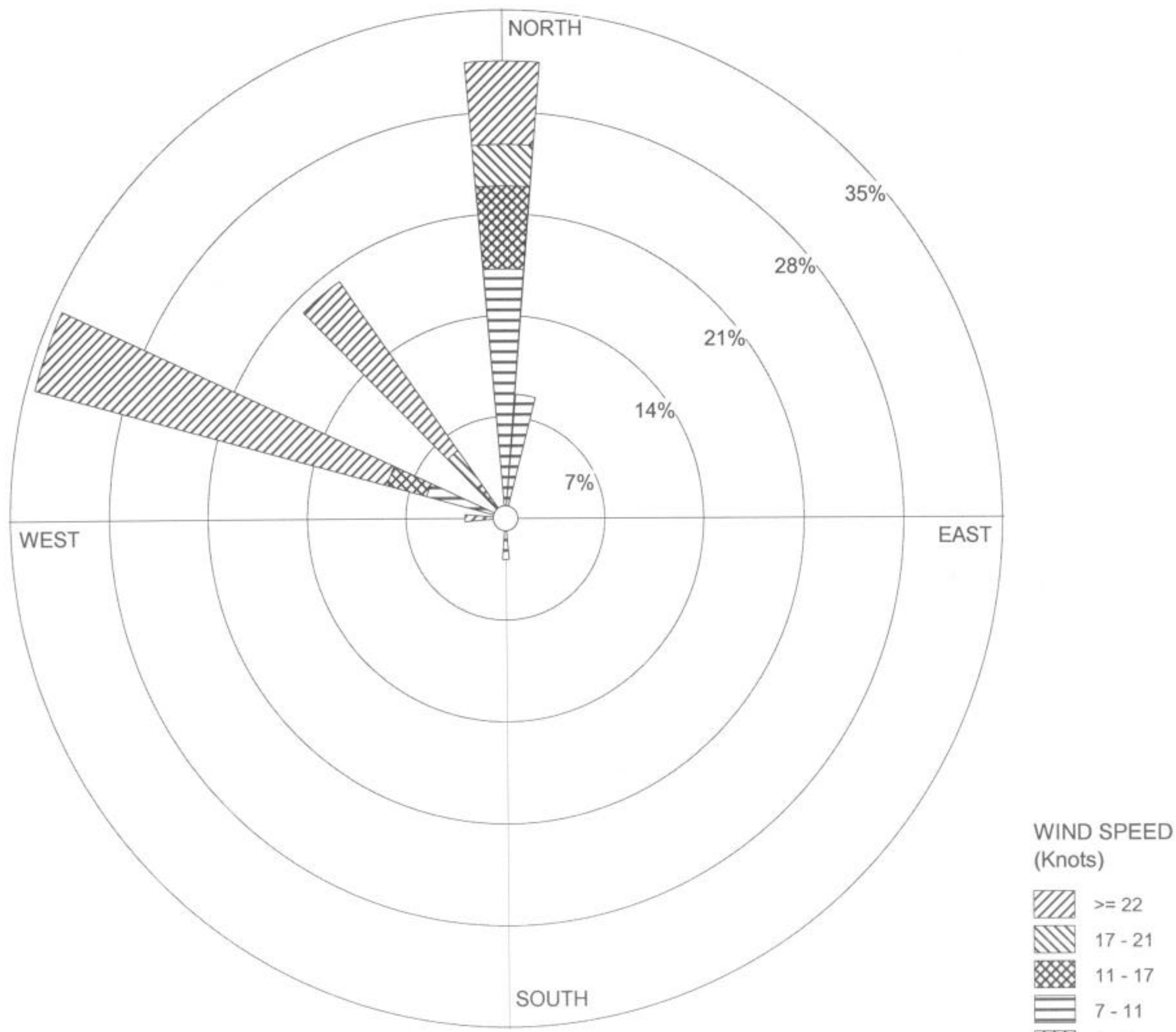
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 21, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 21 - May 21** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **39.47 Knots**		PROJECT NO.:

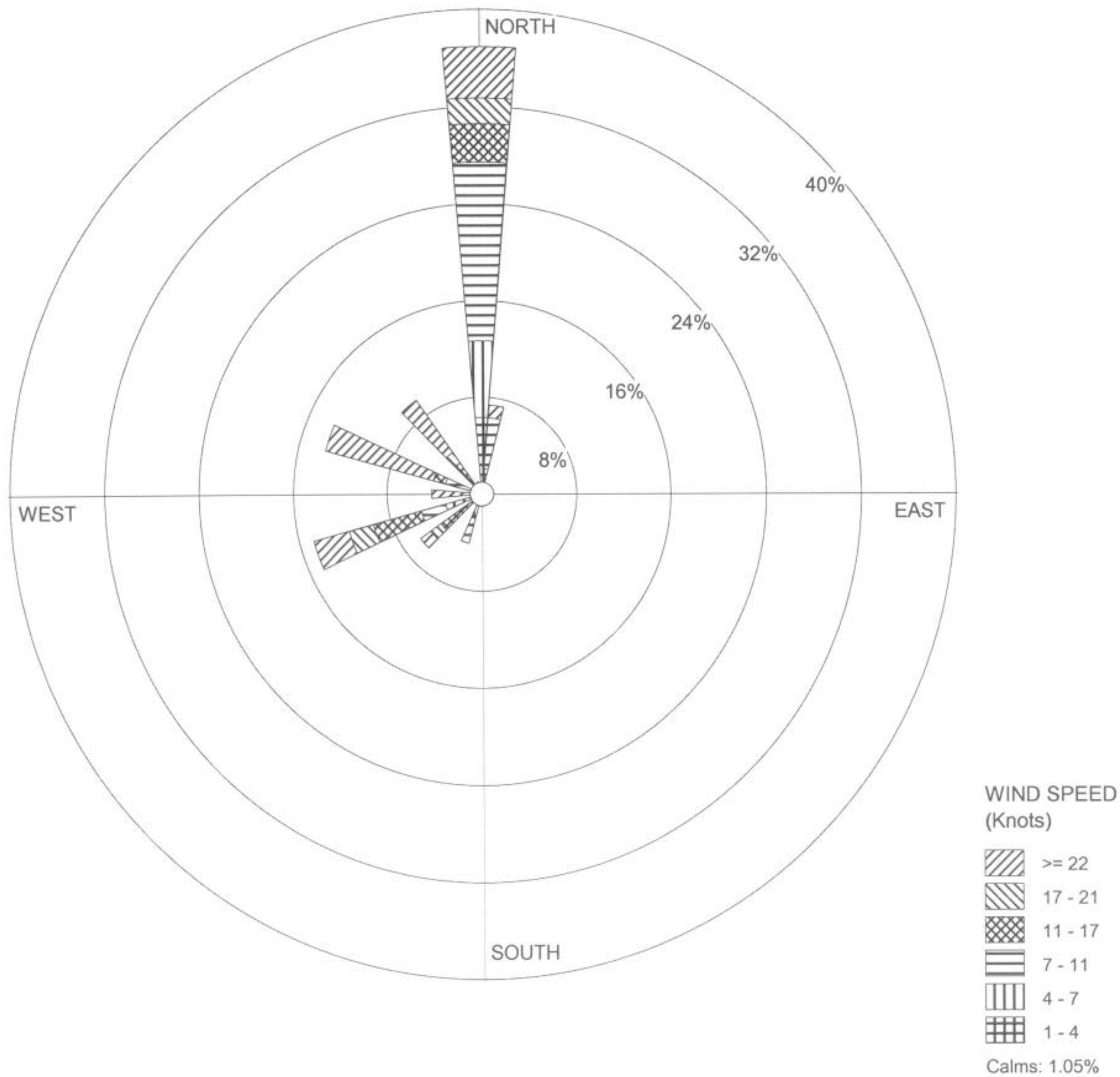
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 21-22, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:
TSP	**2006** **May 21 - May 22** **00:00 - 23:00**	**CH2M HILL**
	CALM WINDS: **1.05%**	CH2MHILL
	AVG. WIND SPEED: **21.99 Knots**	PROJECT NO.:

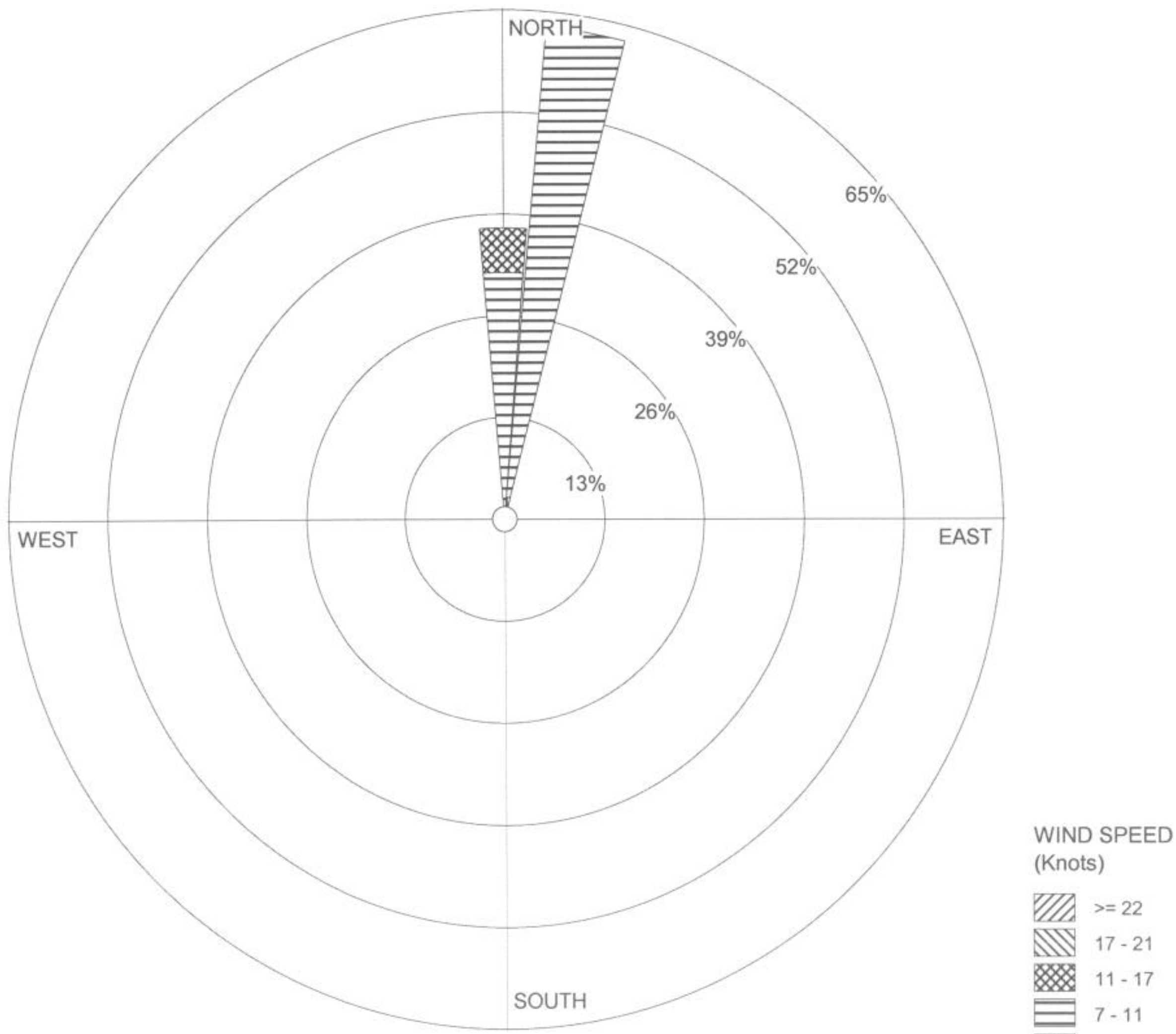
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 22, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
May 22 - May 22
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

8.68 Knots

PROJECT NO.:

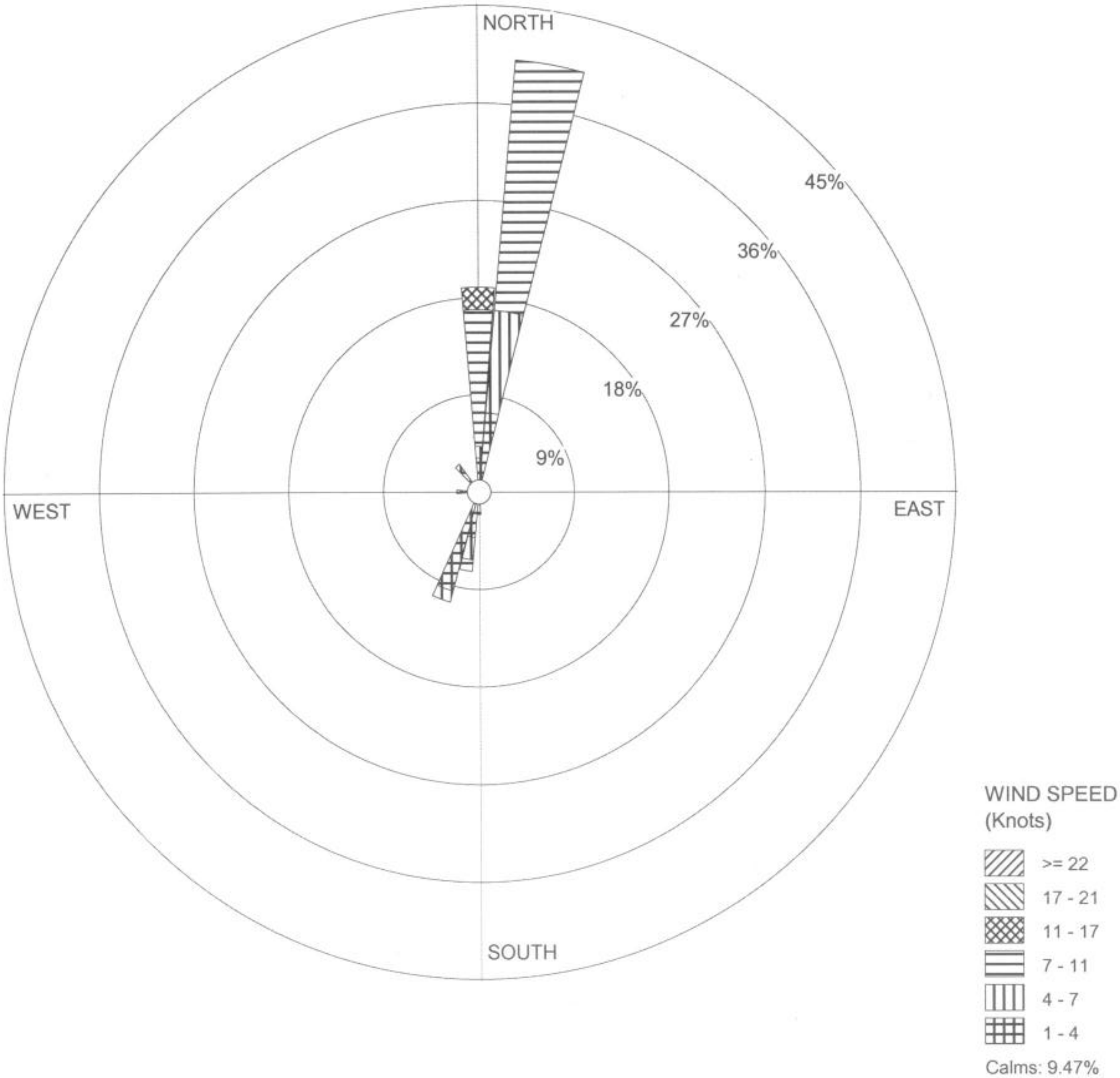
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 22-23, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **May 22 - May 23** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **9.47%**		CH2MHILL
	AVG. WIND SPEED: **5.09 Knots**		PROJECT NO.:

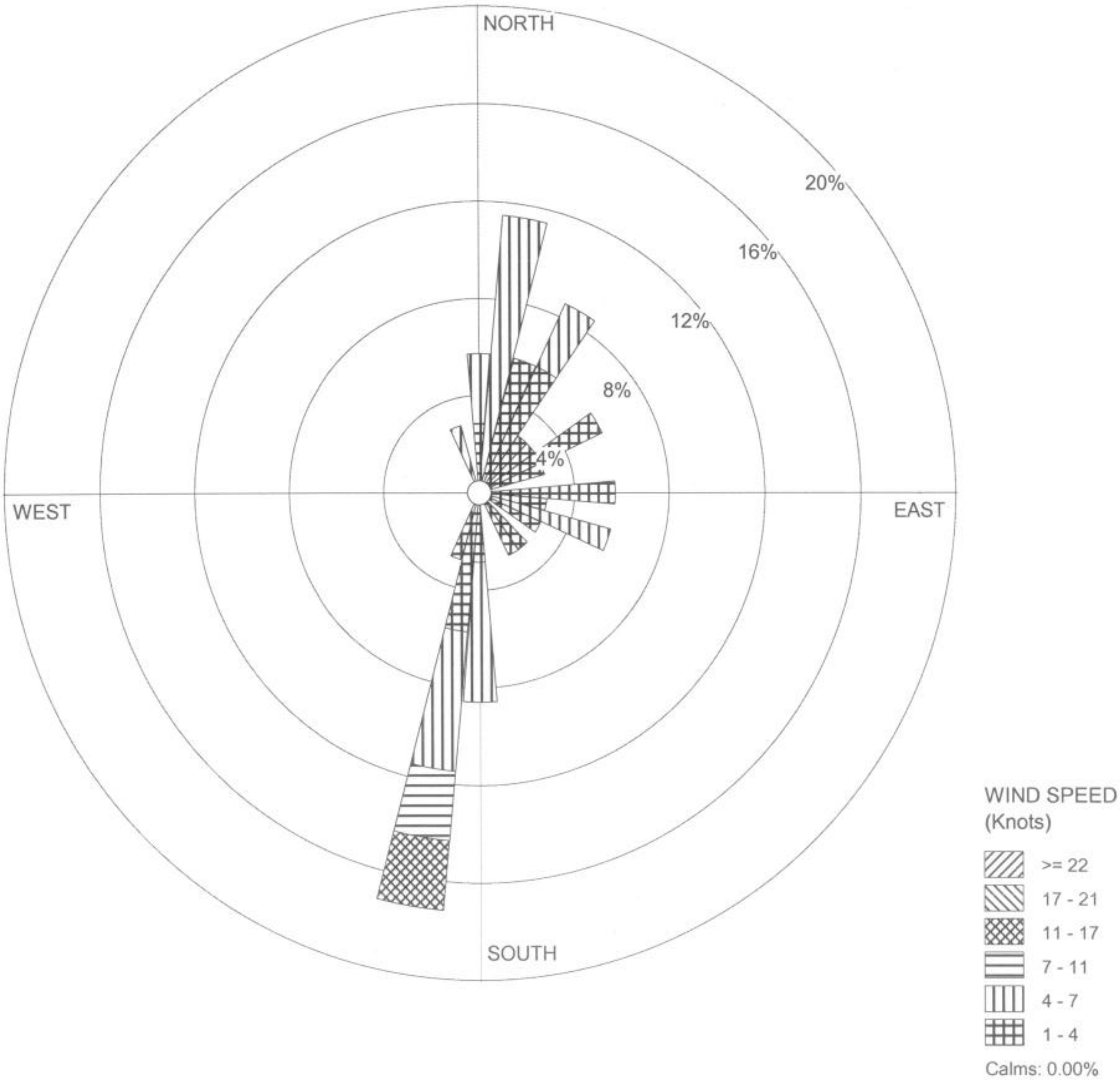
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 23, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
May 23 - May 23
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

4.05 Knots

PROJECT NO.:

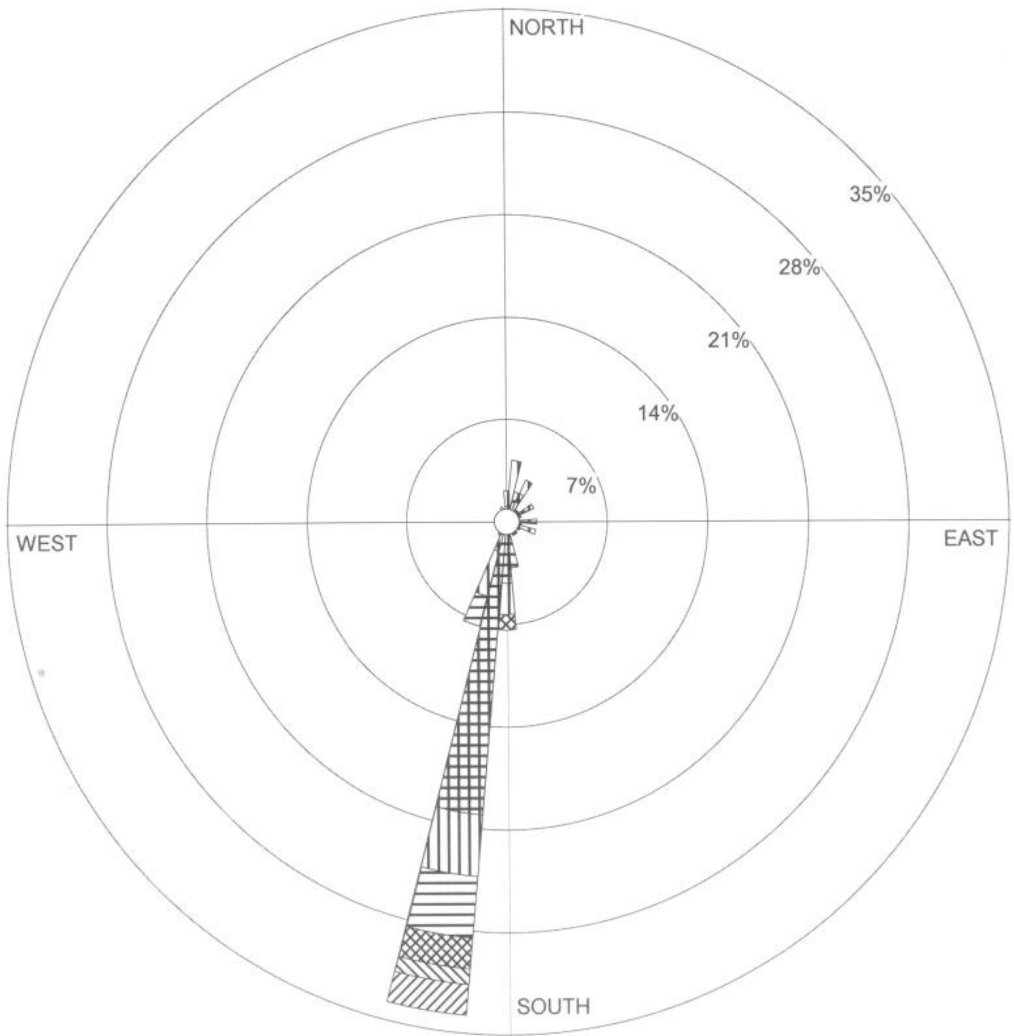
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 23-24, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED (Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 21.05%

COMMENTS:	DATA PERIOD:	COMPANY NAME:
TSP	**2006** **May 23 - May 24** **00:00 - 23:00**	**CH2M HILL**
	CALM WINDS: **21.05%**	
	AVG. WIND SPEED: **3.84 Knots**	PROJECT NO.:

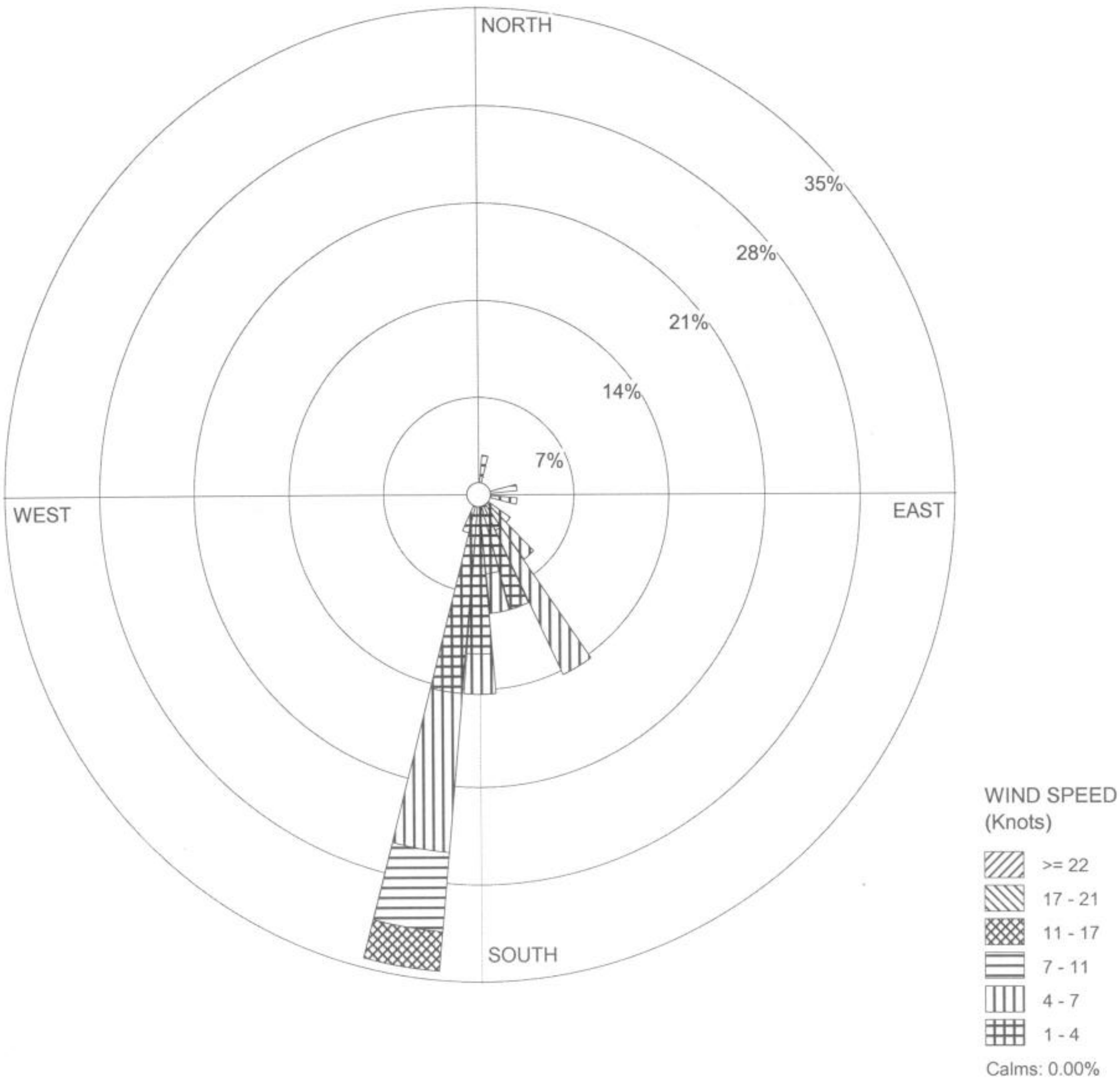
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 30, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **May 30 - May 30** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **4.88 Knots**		PROJECT NO.:

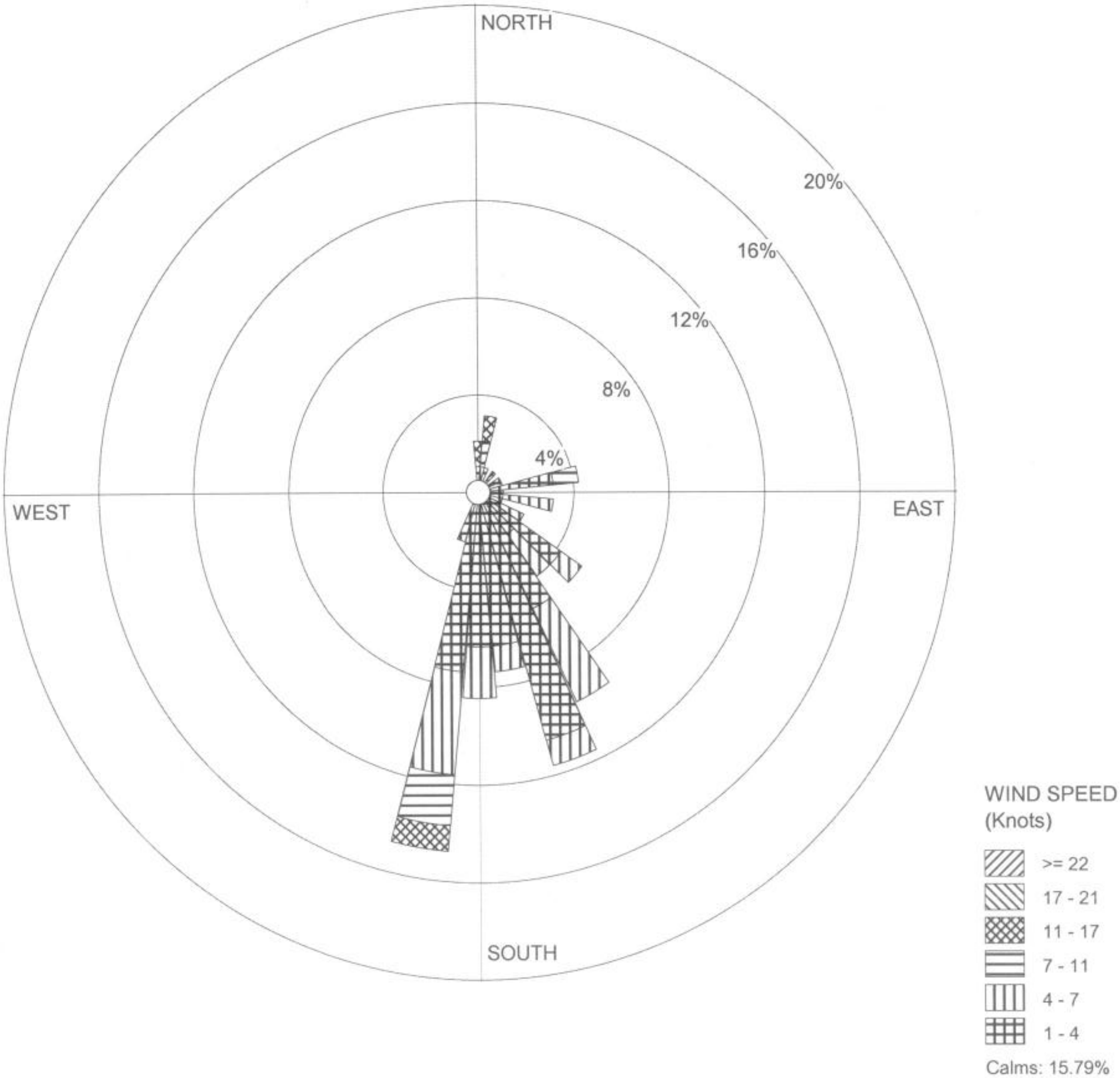
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
May 30-31, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **May 30 - May 31** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **15.79%**		CH2MHILL
	AVG. WIND SPEED: **3.31 Knots**		PROJECT NO.:

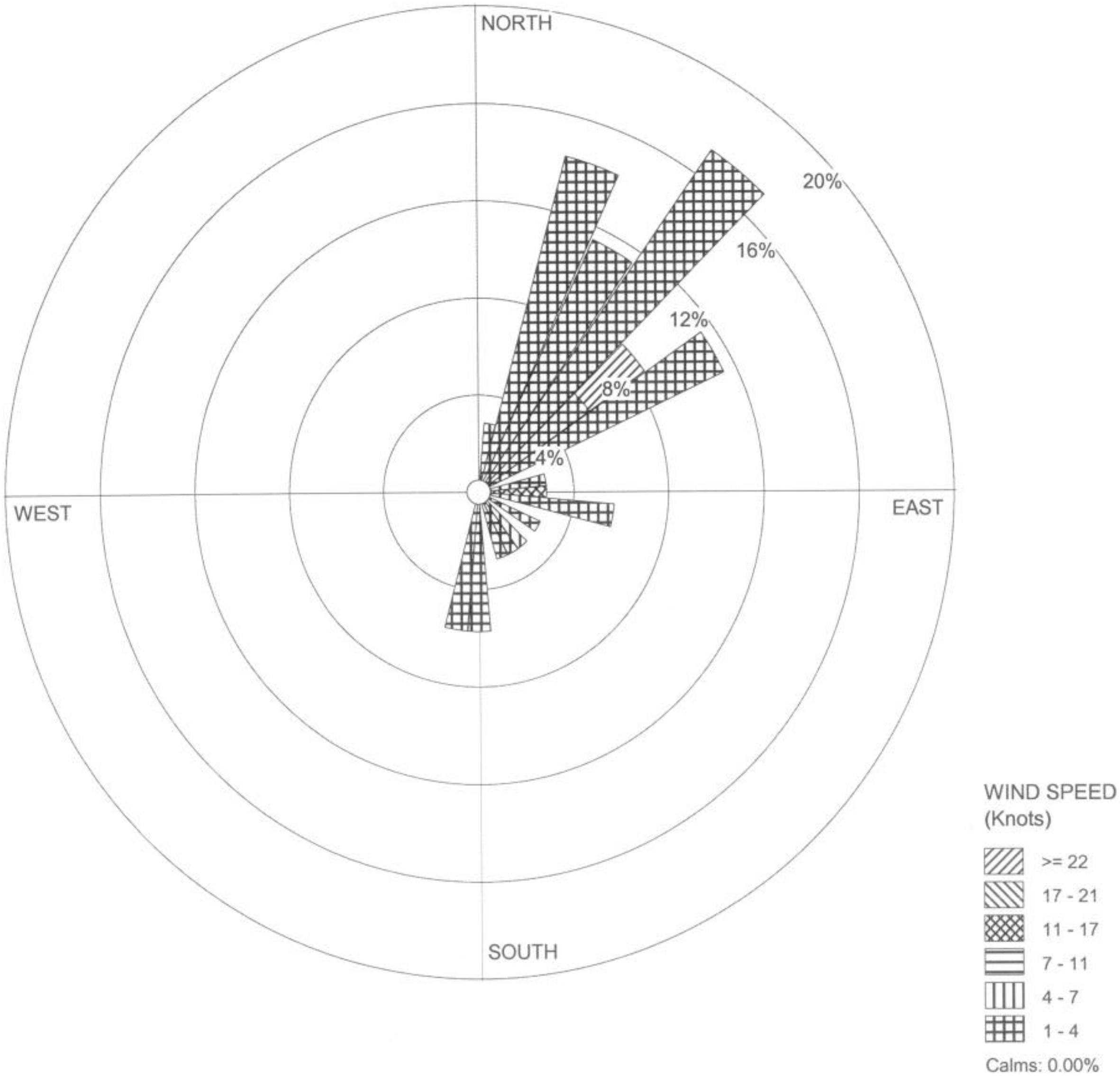
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 2, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: VOCs	DATA PERIOD: **2006** **Jun 2 - Jun 2** **09:00 - 17:00**	COMPANY NAME: **CH2M HILL**
	CALM WINDS: **0.00%**	CH2MHILL
	AVG. WIND SPEED: **3.61 Knots**	PROJECT NO.:

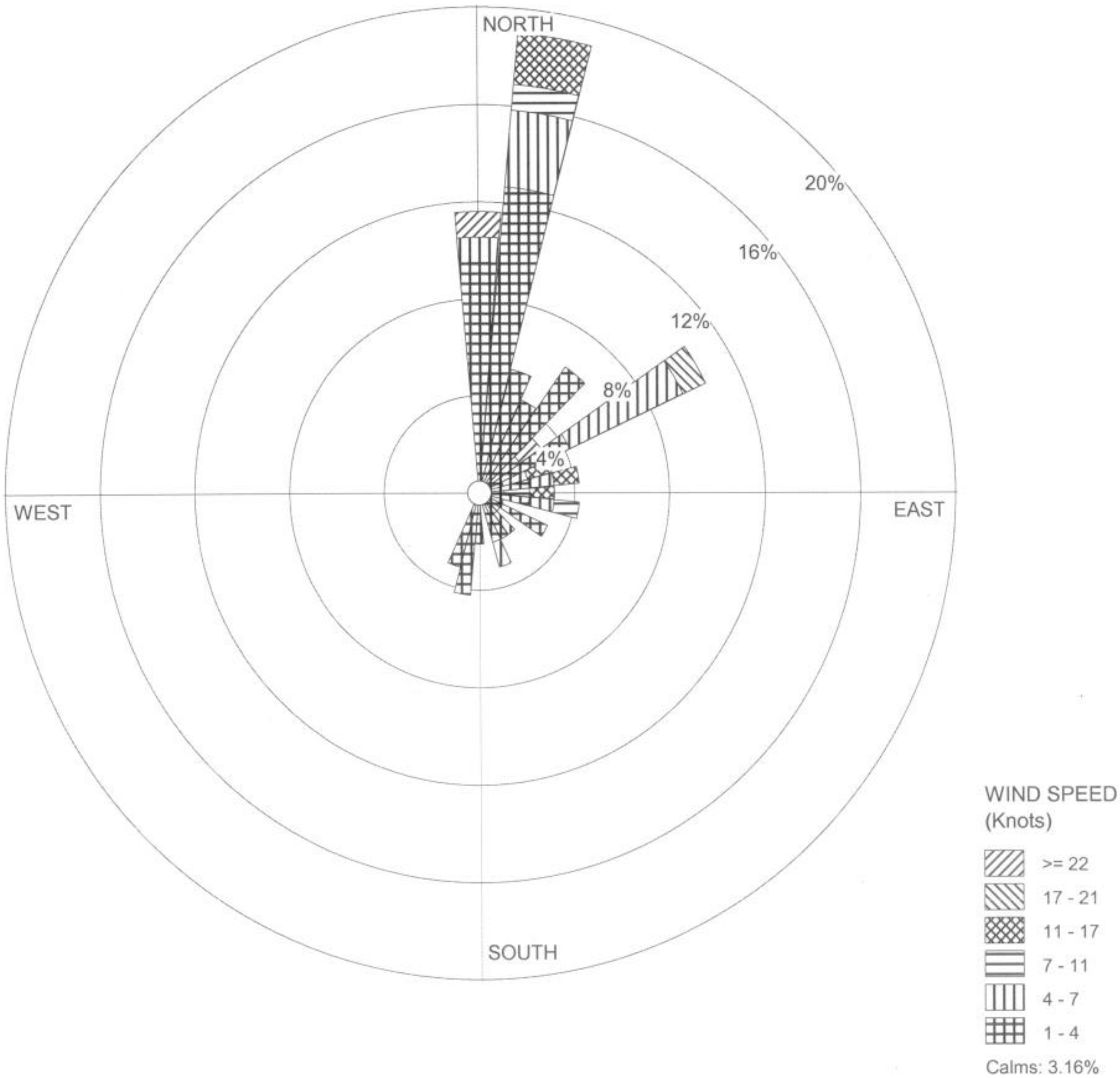
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 2-3, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 2 - Jun 3** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **3.16%**		CH2MHILL
	AVG. WIND SPEED: **4.38 Knots**		PROJECT NO.:

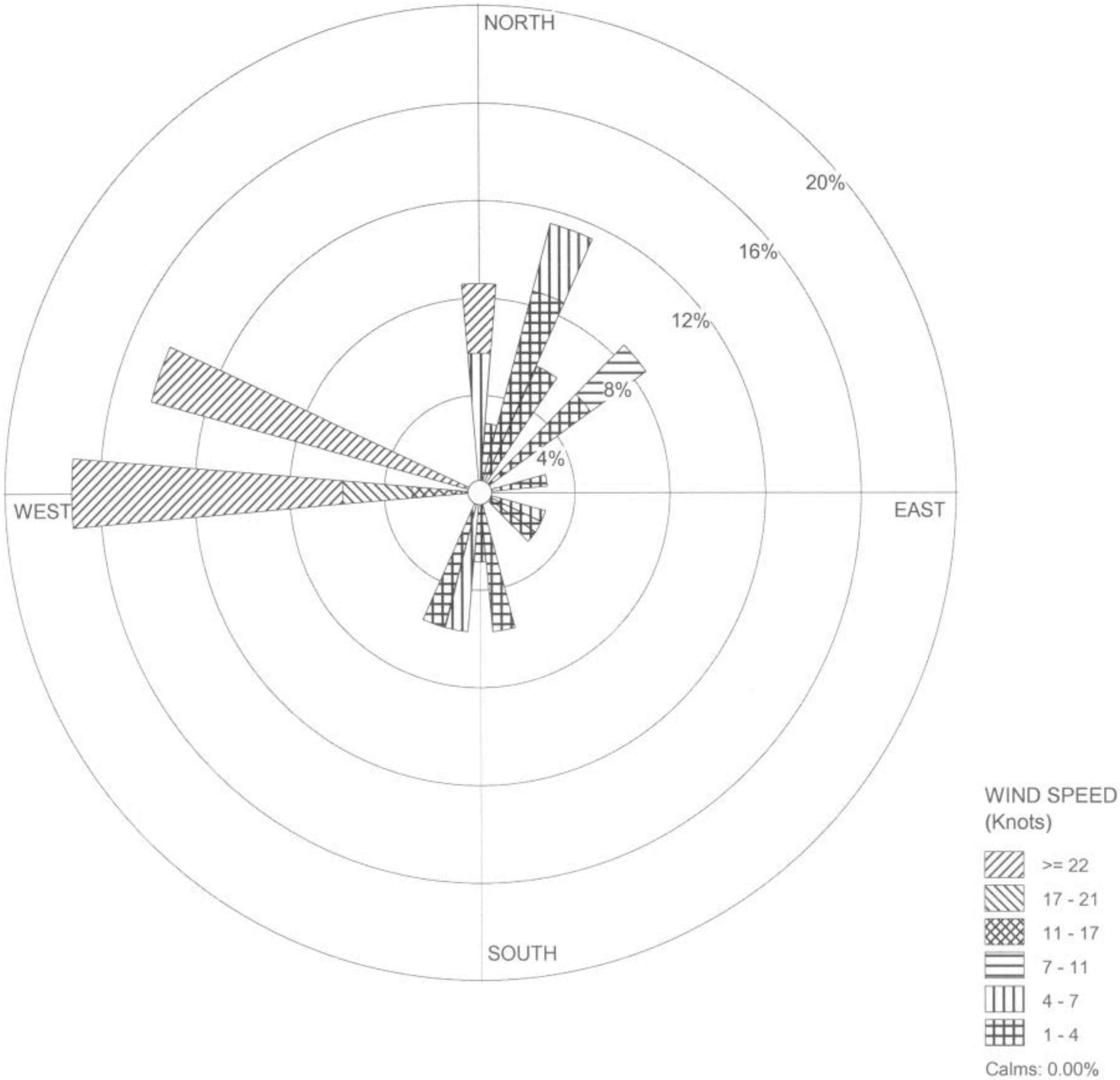
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 5, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
Jun 5 - Jun 5
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

16.02 Knots

PROJECT NO.:

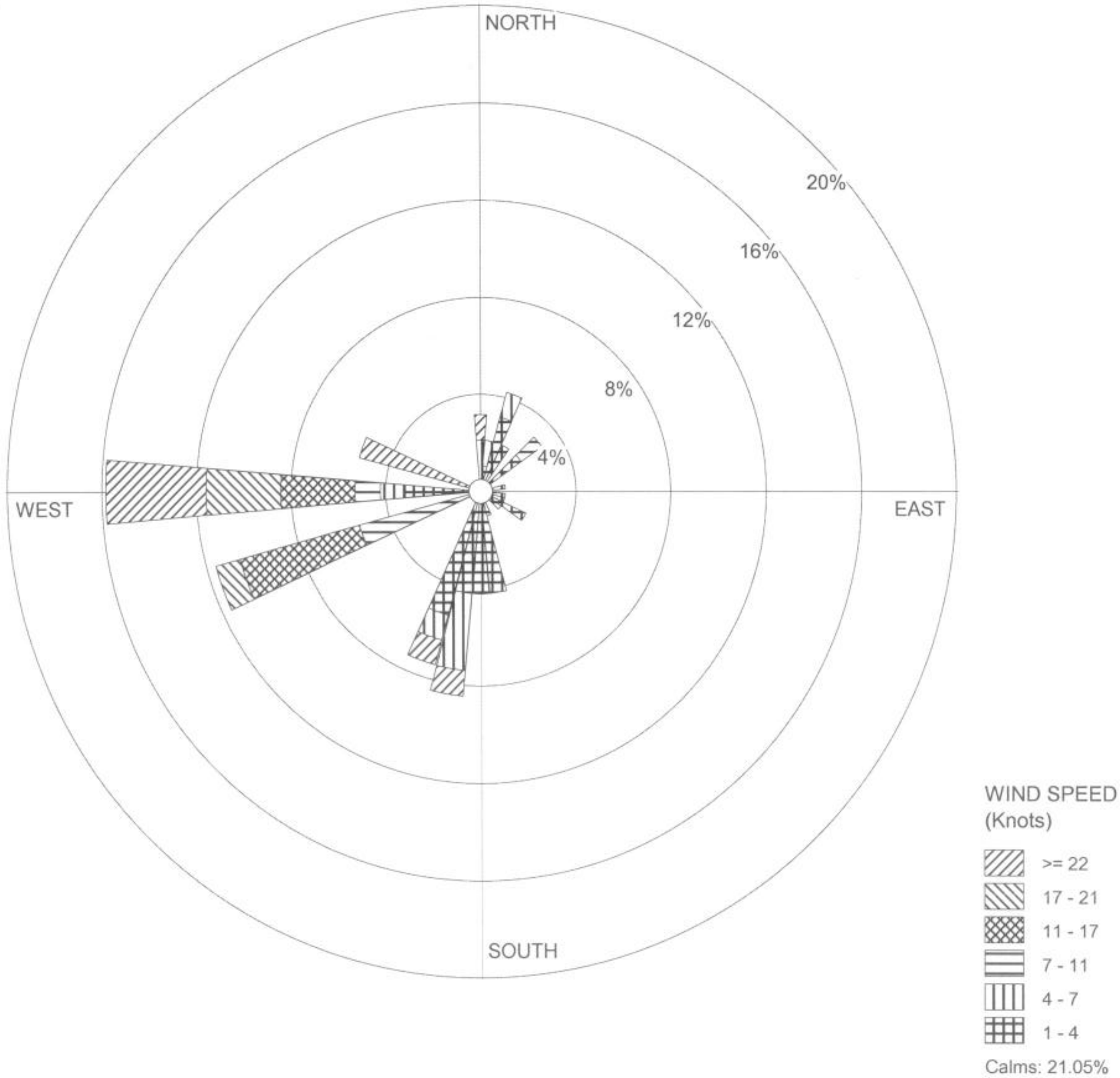
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 5-6, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 5 - Jun 6** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **21.05%**		CH2MHILL
	AVG. WIND SPEED: **9.17 Knots**		PROJECT NO.:

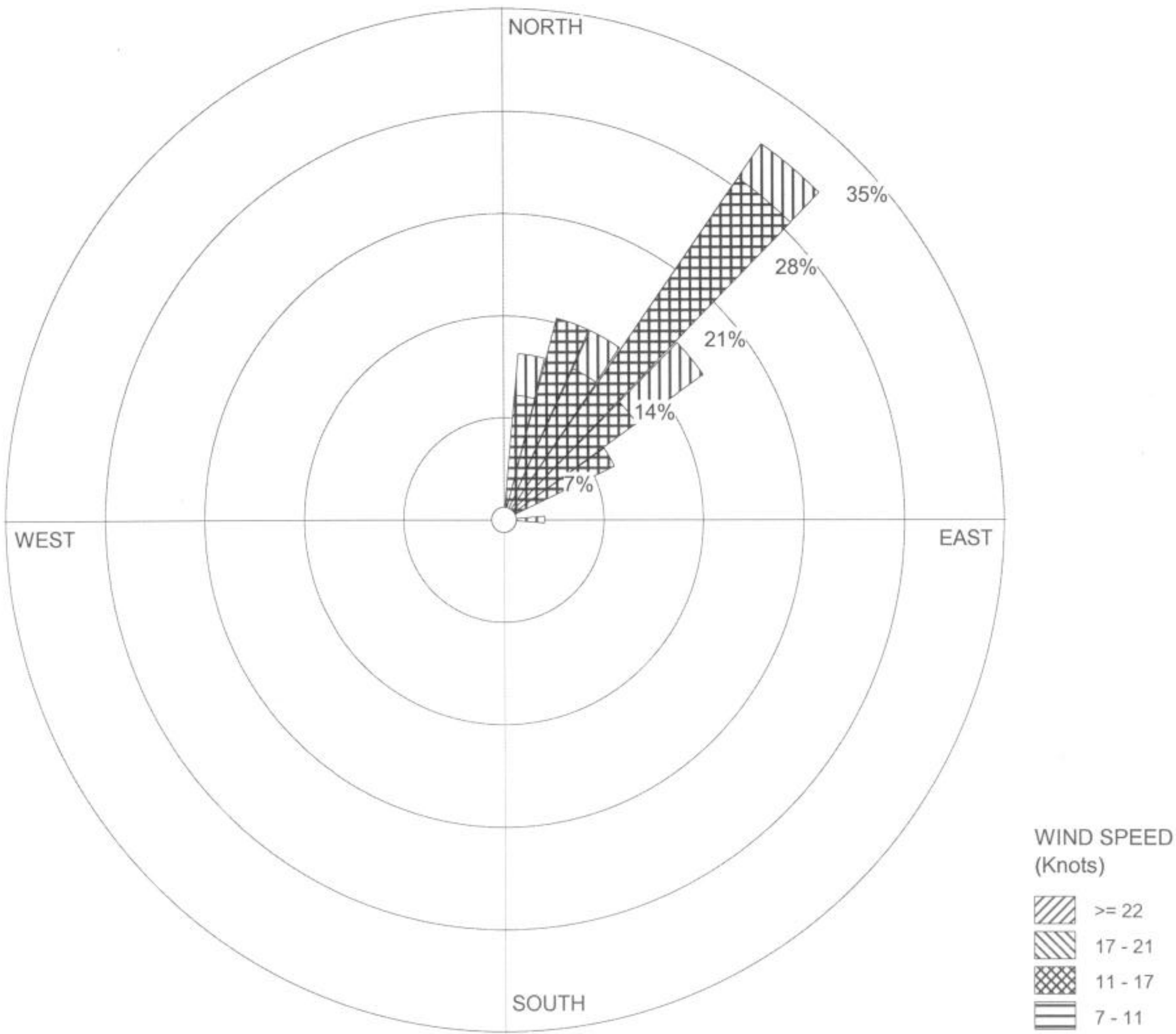
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 12, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
Jun 12 - Jun 12
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

3.73 Knots

PROJECT NO.:

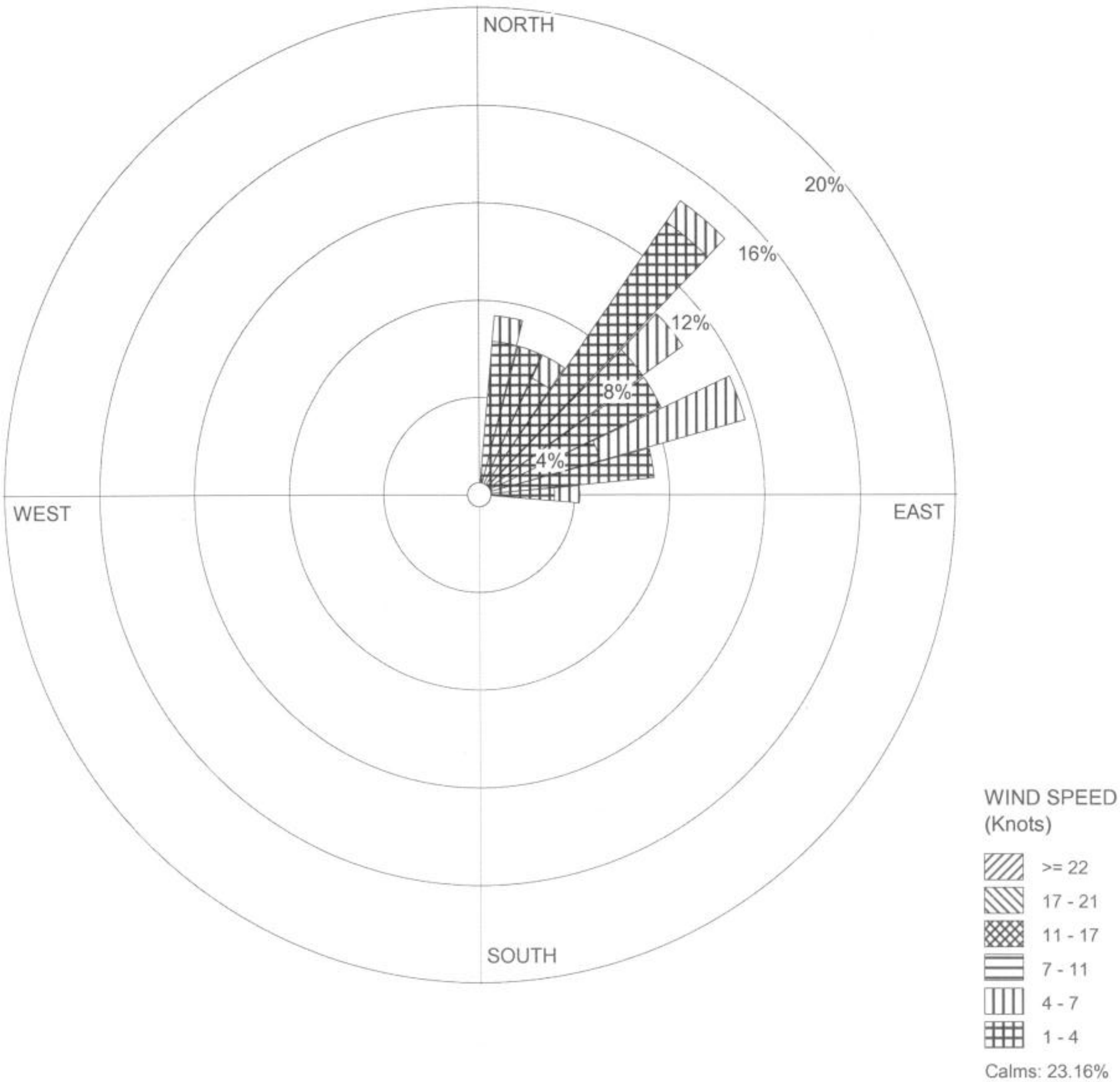
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 12-13, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
Jun 12 - Jun 13
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

23.16%

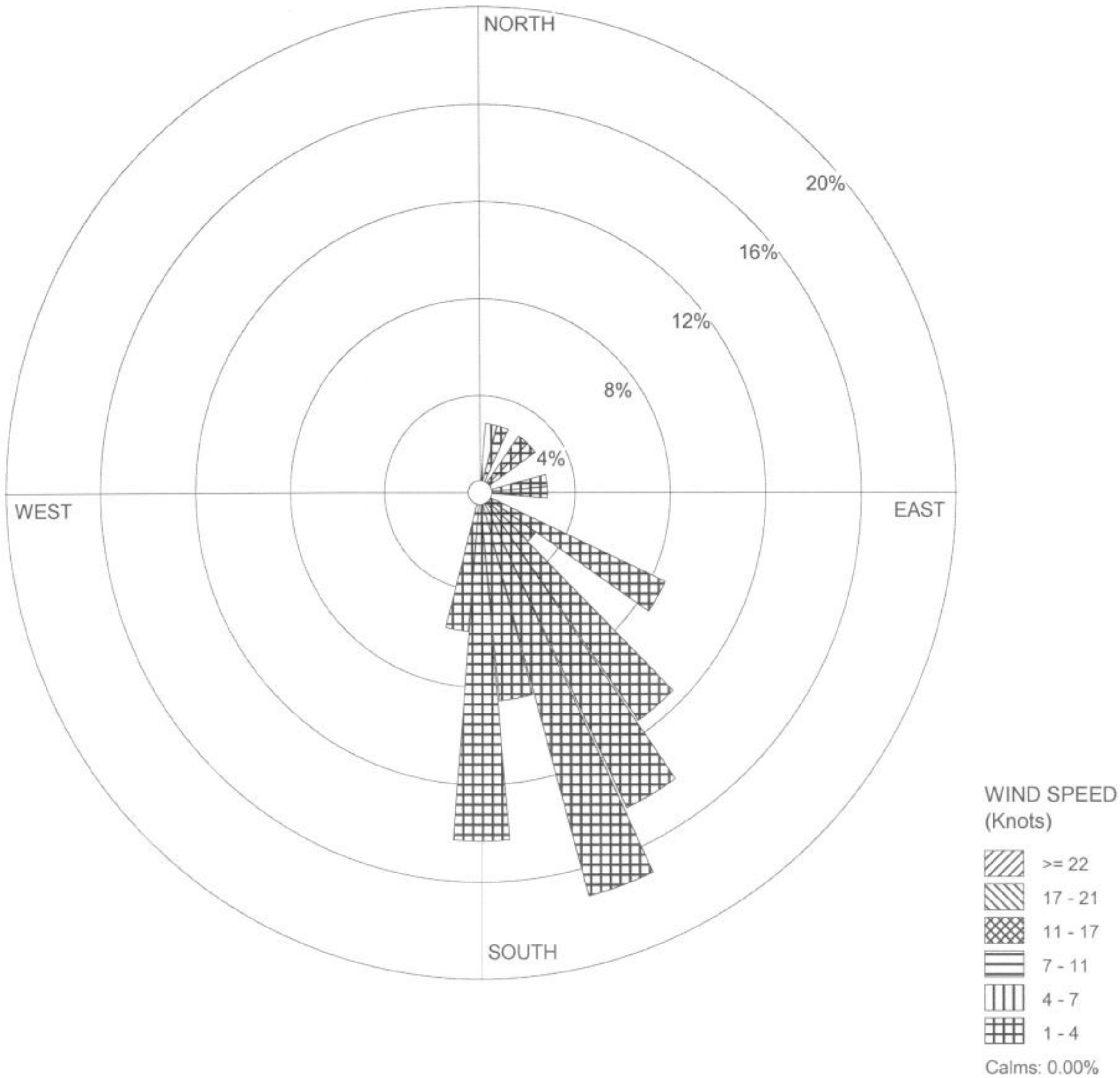
AVG. WIND SPEED:

2.47 Knots

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:	DISPLAY:
Velsicol Pine River **June 15, 2006 (8-Hour)**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **Jun 15 - Jun 15** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **2.74 Knots**		PROJECT NO.:

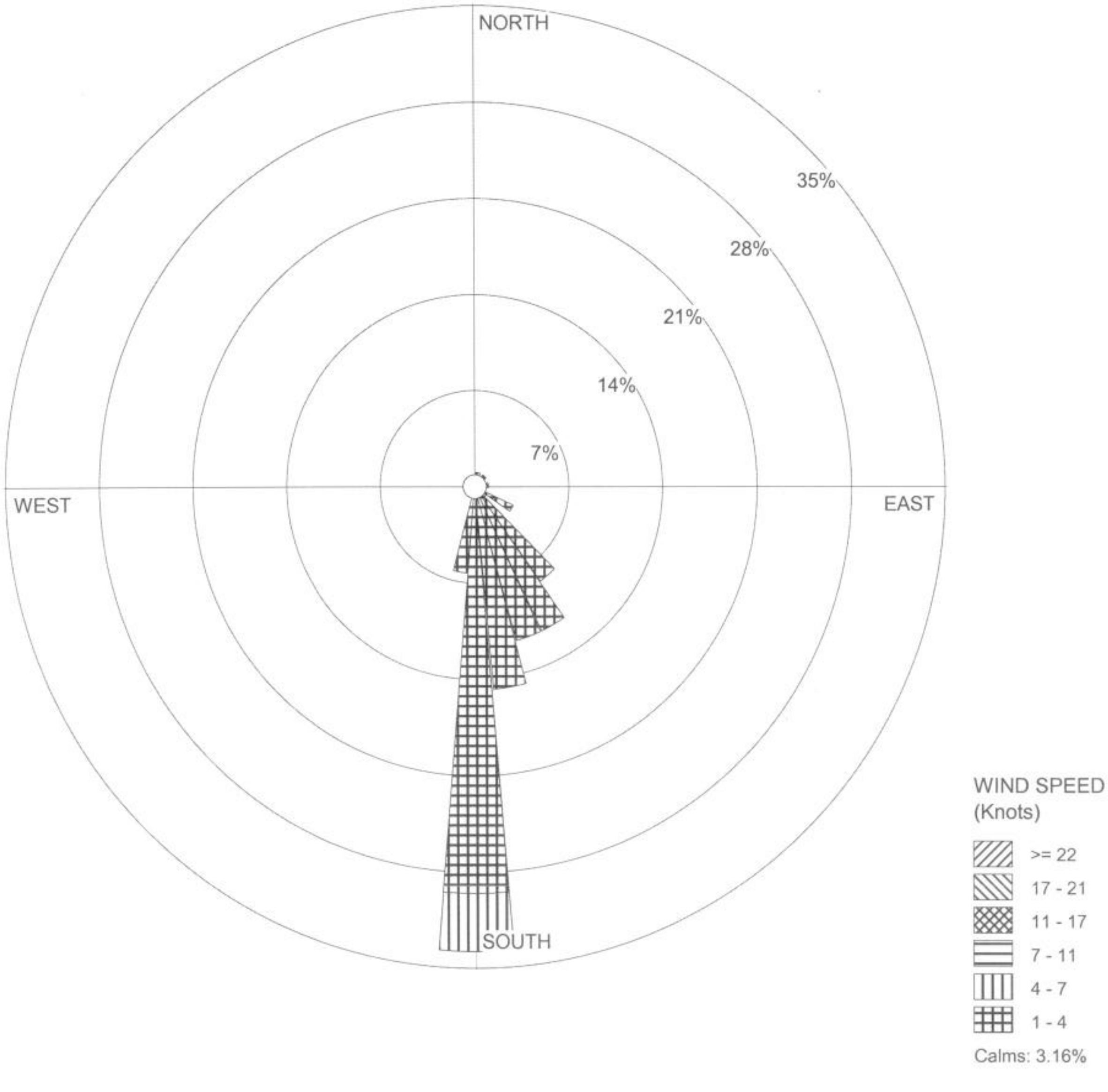
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 15-16, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 15 - Jun 16** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **3.16%**		CH2MHILL
	AVG. WIND SPEED: **2.66 Knots**		PROJECT NO.:

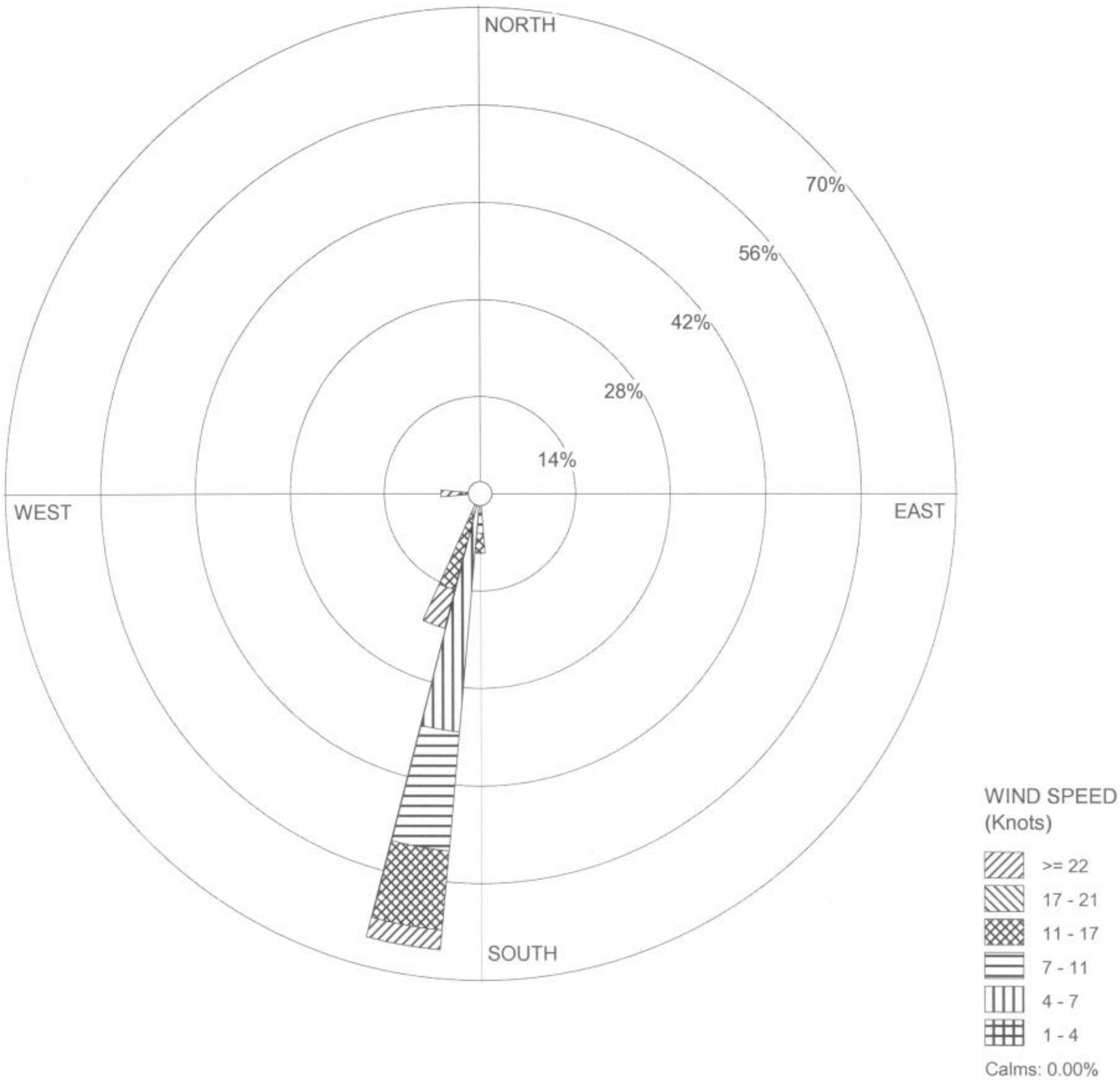
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 19, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

VOCs

DATA PERIOD:

2006
Jun 19 - Jun 19
09:00 - 17:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

0.00%

AVG. WIND SPEED:

10.39 Knots

PROJECT NO.:

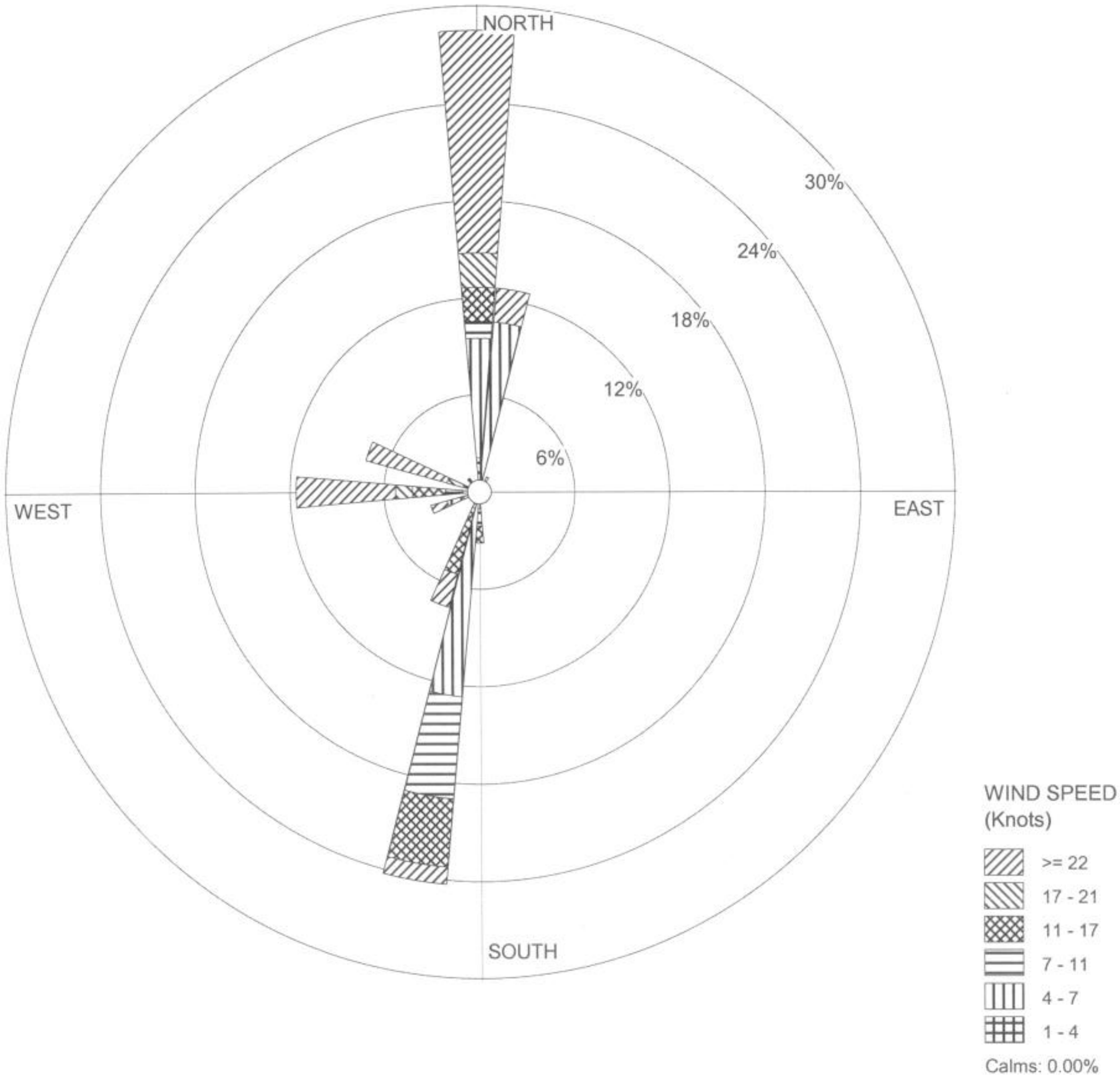
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 19-20, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



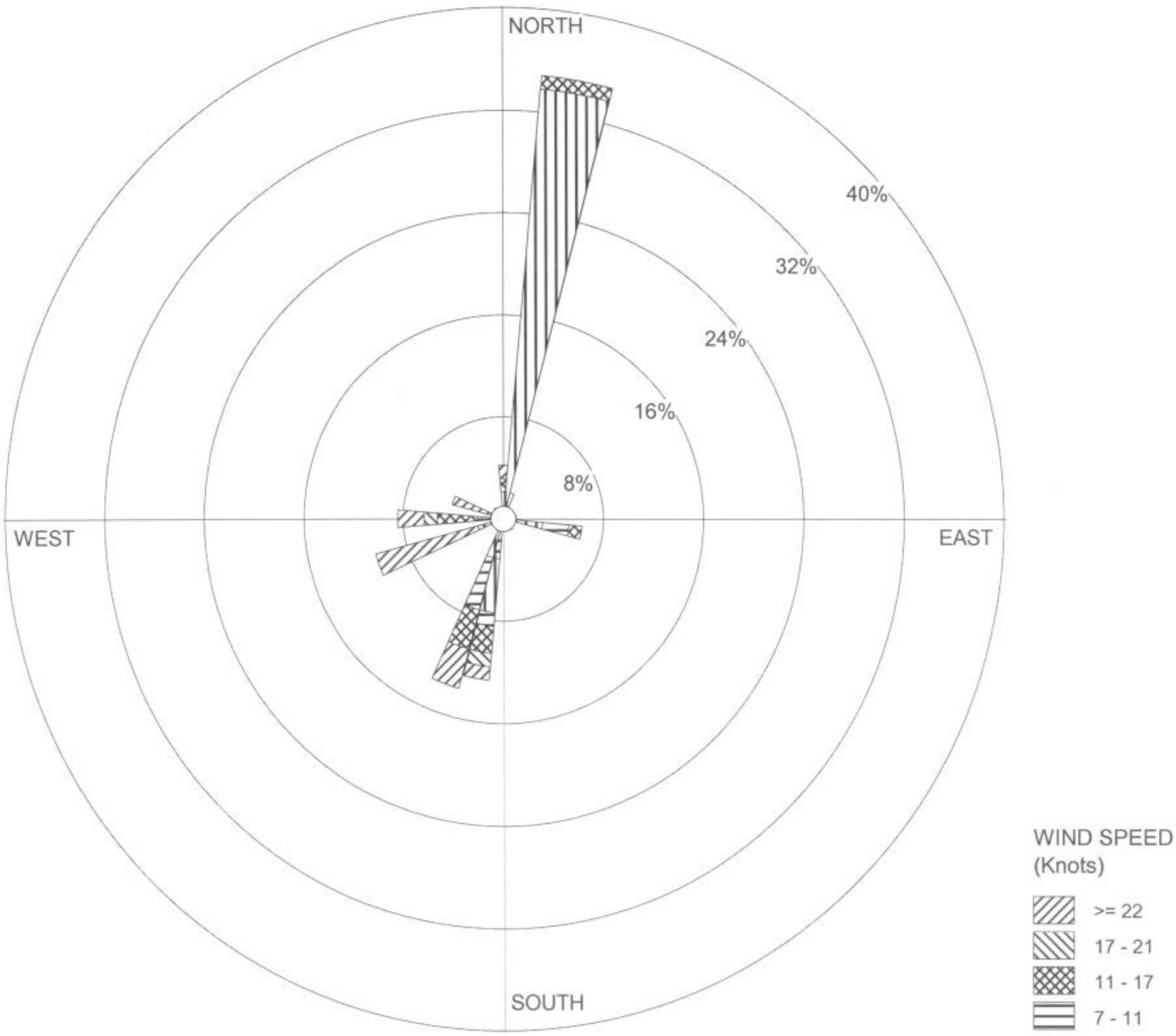
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 19 - Jun 20** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **20.30 Knots**		PROJECT NO.:

WIND ROSE PLOT:

Velsicol Pine River
June 22-23, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 22 - Jun 23** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **15.75 Knots**		PROJECT NO.:

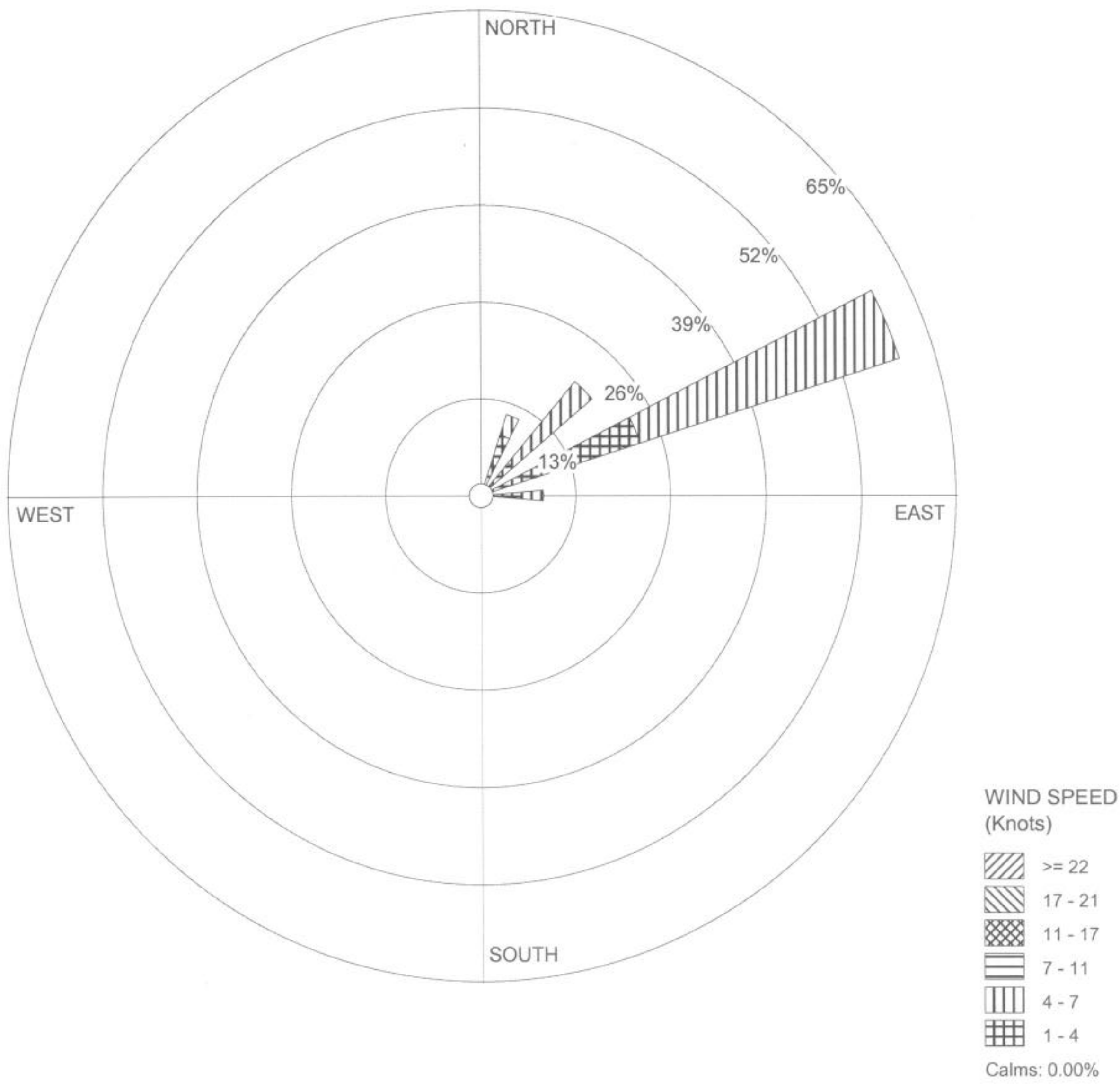
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 26, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



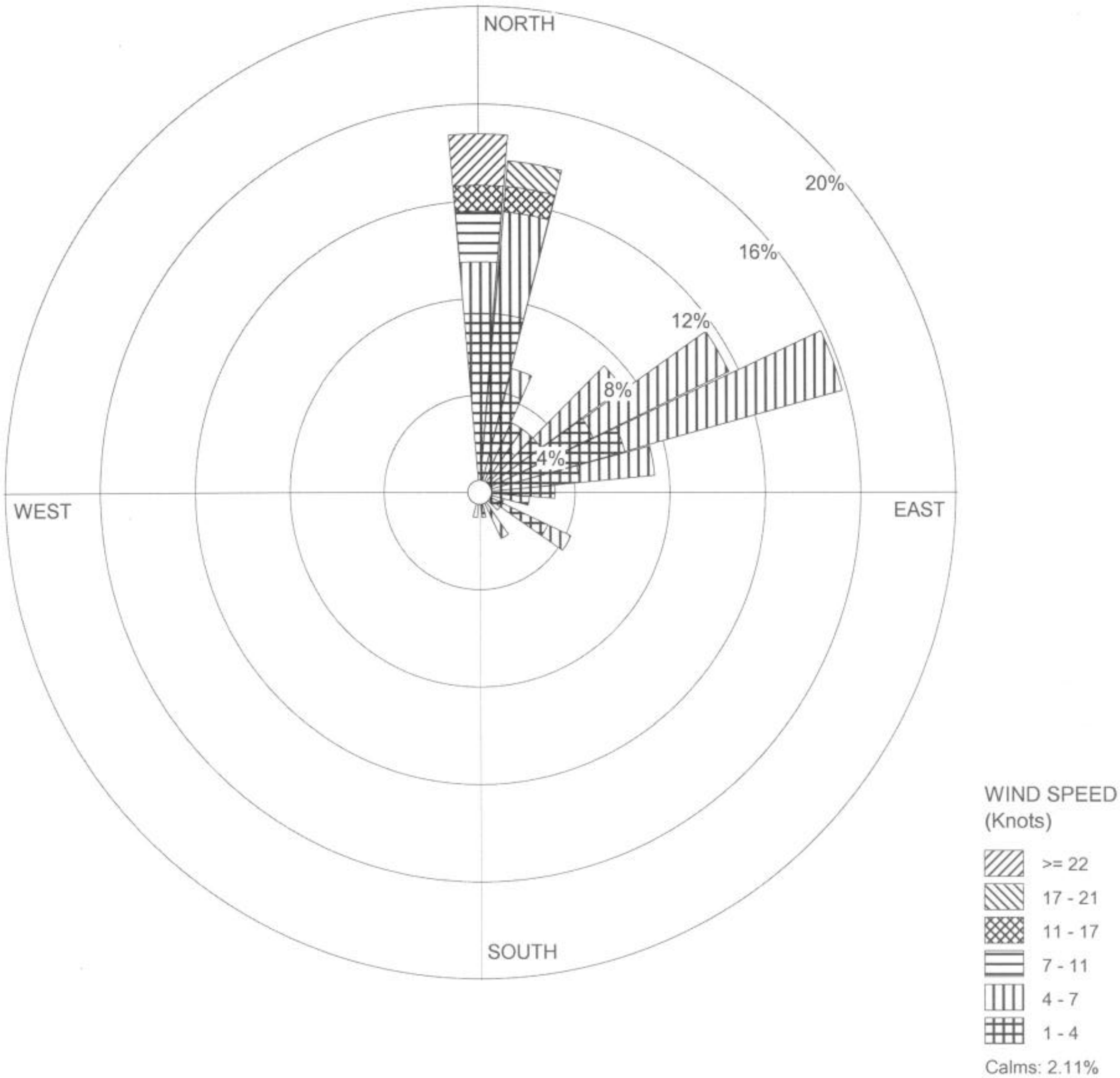
COMMENTS:	DATA PERIOD:	COMPANY NAME:
VOCs	2006 Jun 26 - Jun 26 09:00 - 17:00	CH2M HILL
	CALM WINDS: 0.00%	
	AVG. WIND SPEED: 4.34 Knots	PROJECT NO.:

WIND ROSE PLOT:

Velsicol Pine River
June 26-27, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: TSP	DATA PERIOD: **2006** **Jun 26 - Jun 27** **00:00 - 23:00**	COMPANY NAME: **CH2M HILL**
	CALM WINDS: **2.11%**	CH2MHILL
	AVG. WIND SPEED: **4.52 Knots**	PROJECT NO.:

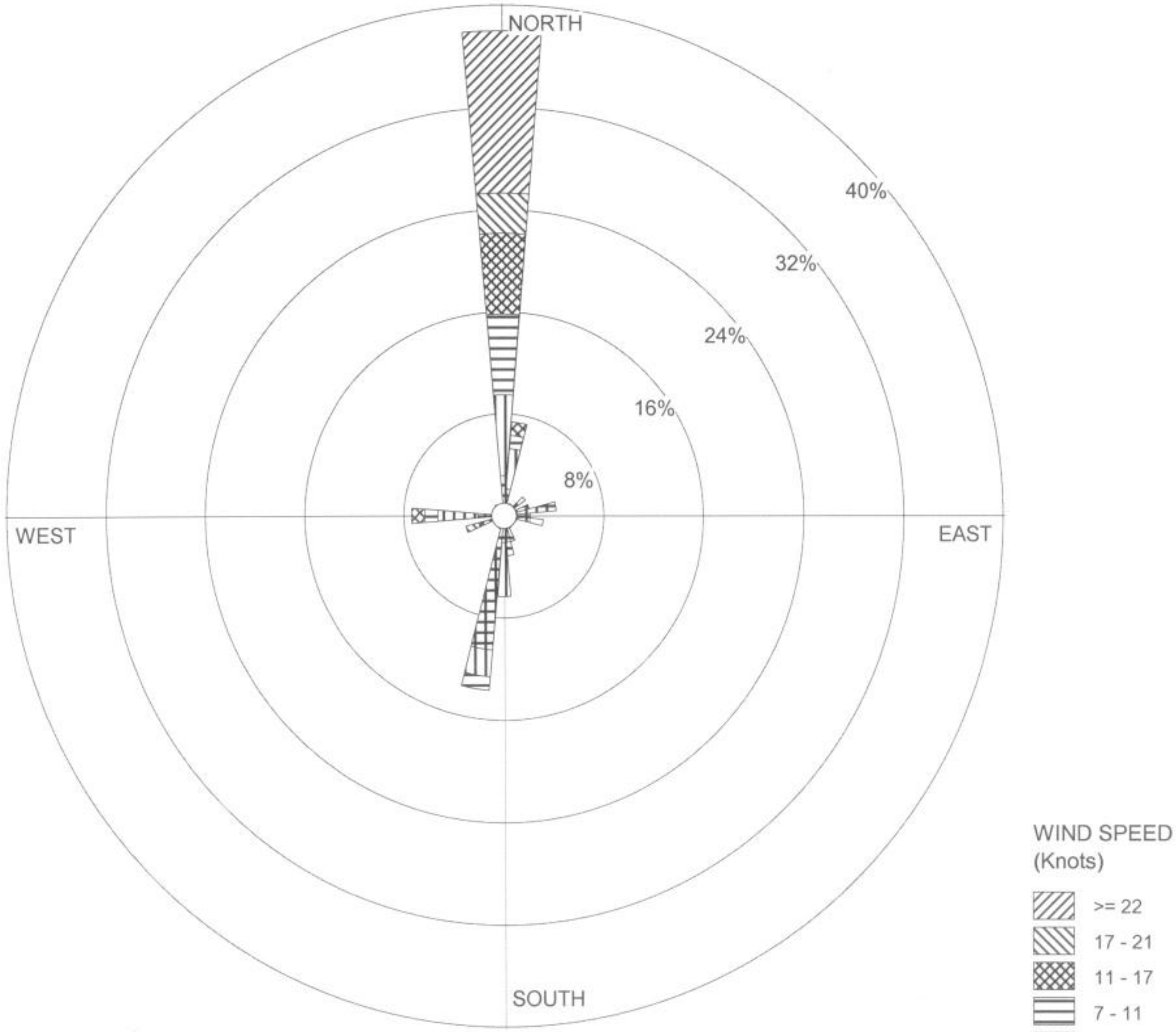
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
June 28-29, 2006 (24-Hour)

DISPLAY:

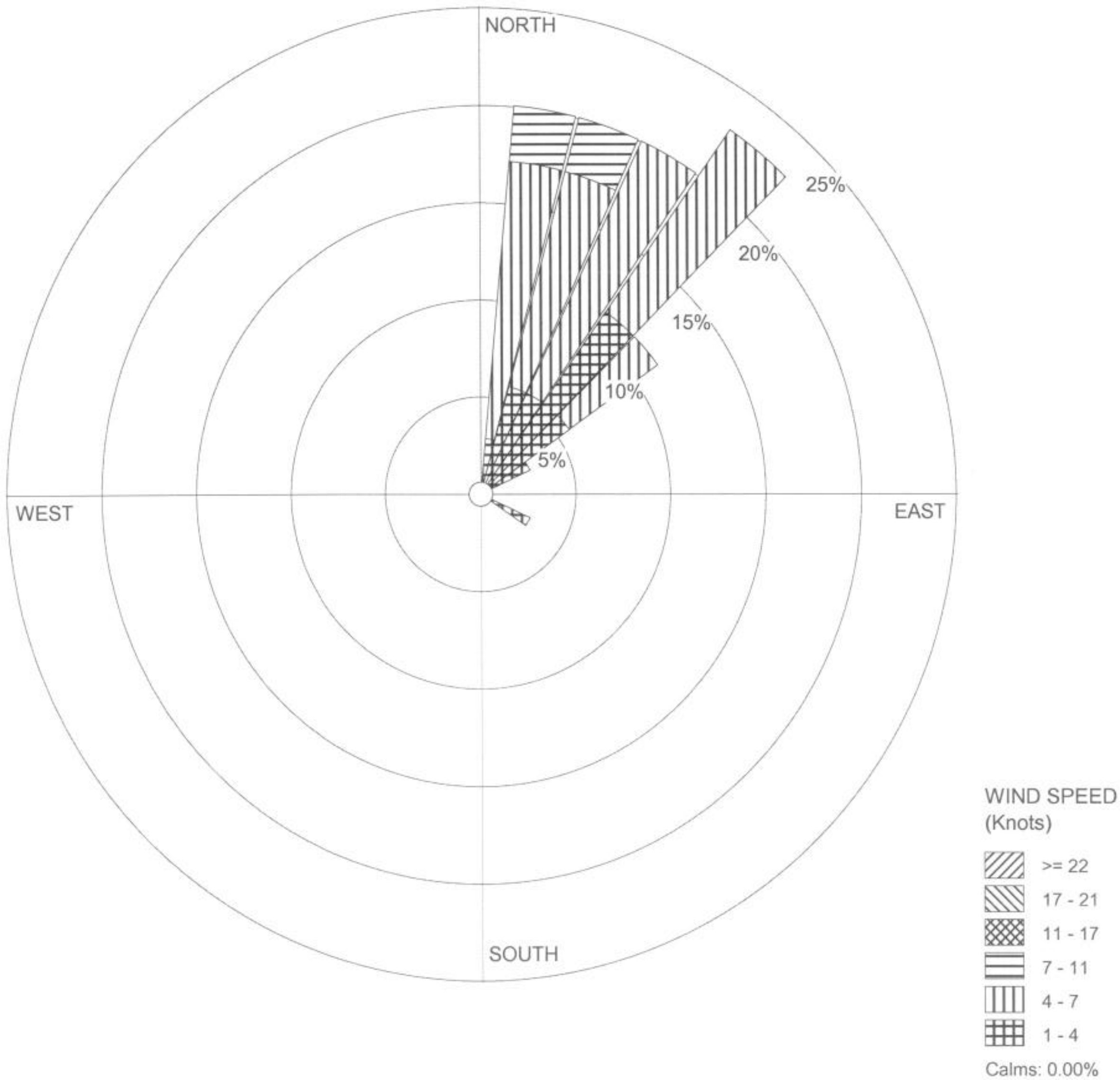
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jun 28 - Jun 29** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **10.71 Knots**		PROJECT NO.:

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:	DISPLAY:
Velsicol Pine River **July 6, 2006 (8-Hour)**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **Jul 6 - Jul 6** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **4.73 Knots**		PROJECT NO.:

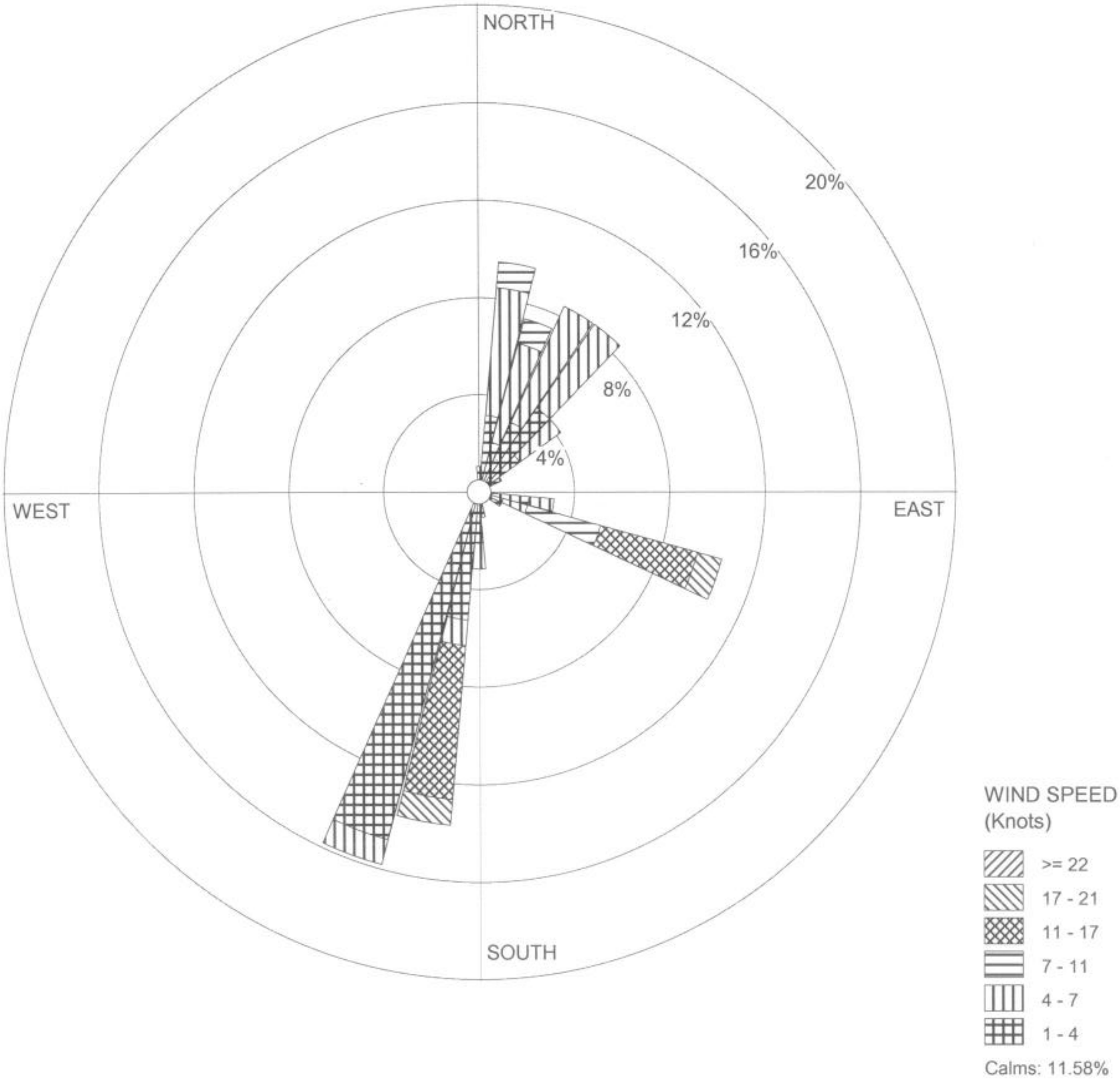
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
July 6-7, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
TSP	**2006** **Jul 6 - Jul 7** **00:00 - 23:00**	**CH2M HILL**	
	CALM WINDS: **11.58%**		CH2MHILL
	AVG. WIND SPEED: **4.78 Knots**		PROJECT NO.:

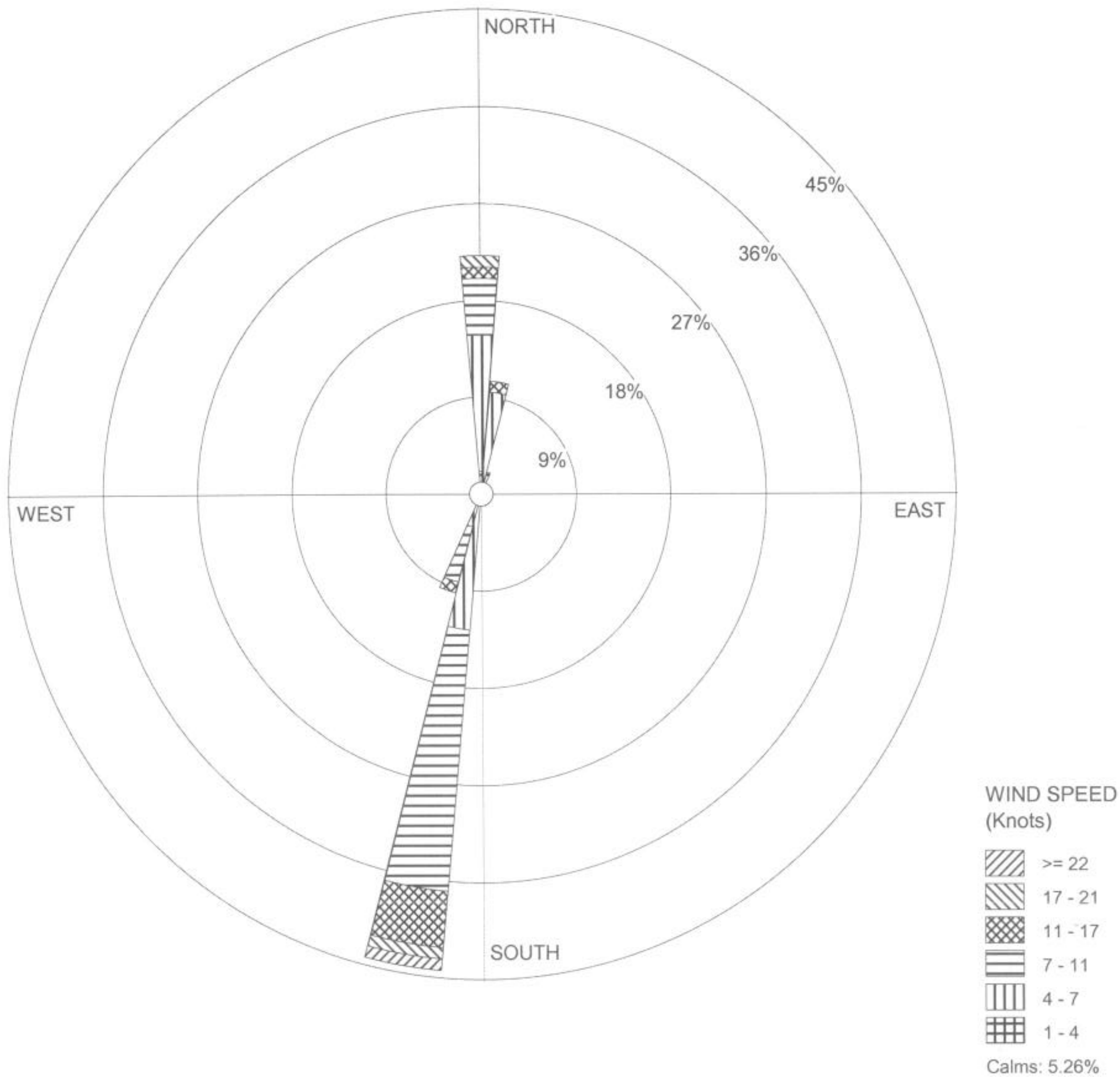
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
July 9-10, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:
TSP	2006 Jul 9 - Jul 10 00:00 - 23:00	CH2M HILL
	CALM WINDS: 5.26%	
	AVG. WIND SPEED: 7.48 Knots	PROJECT NO.:

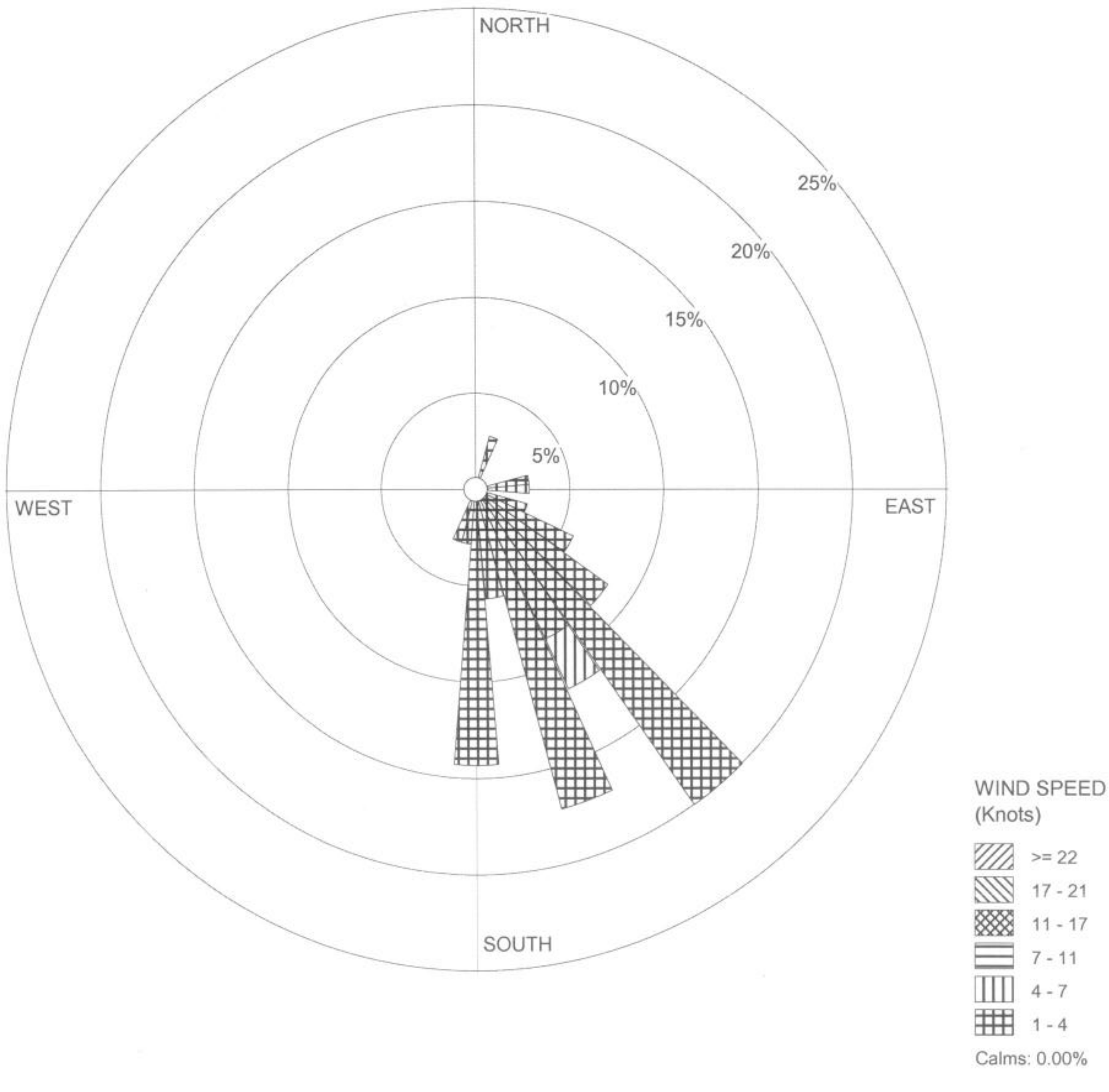
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
July 14, 2006 (8-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
VOCs	**2006** **Jul 14 - Jul 14** **09:00 - 17:00**	**CH2M HILL**	
	CALM WINDS: **0.00%**		CH2MHILL
	AVG. WIND SPEED: **3.09 Knots**		PROJECT NO.:

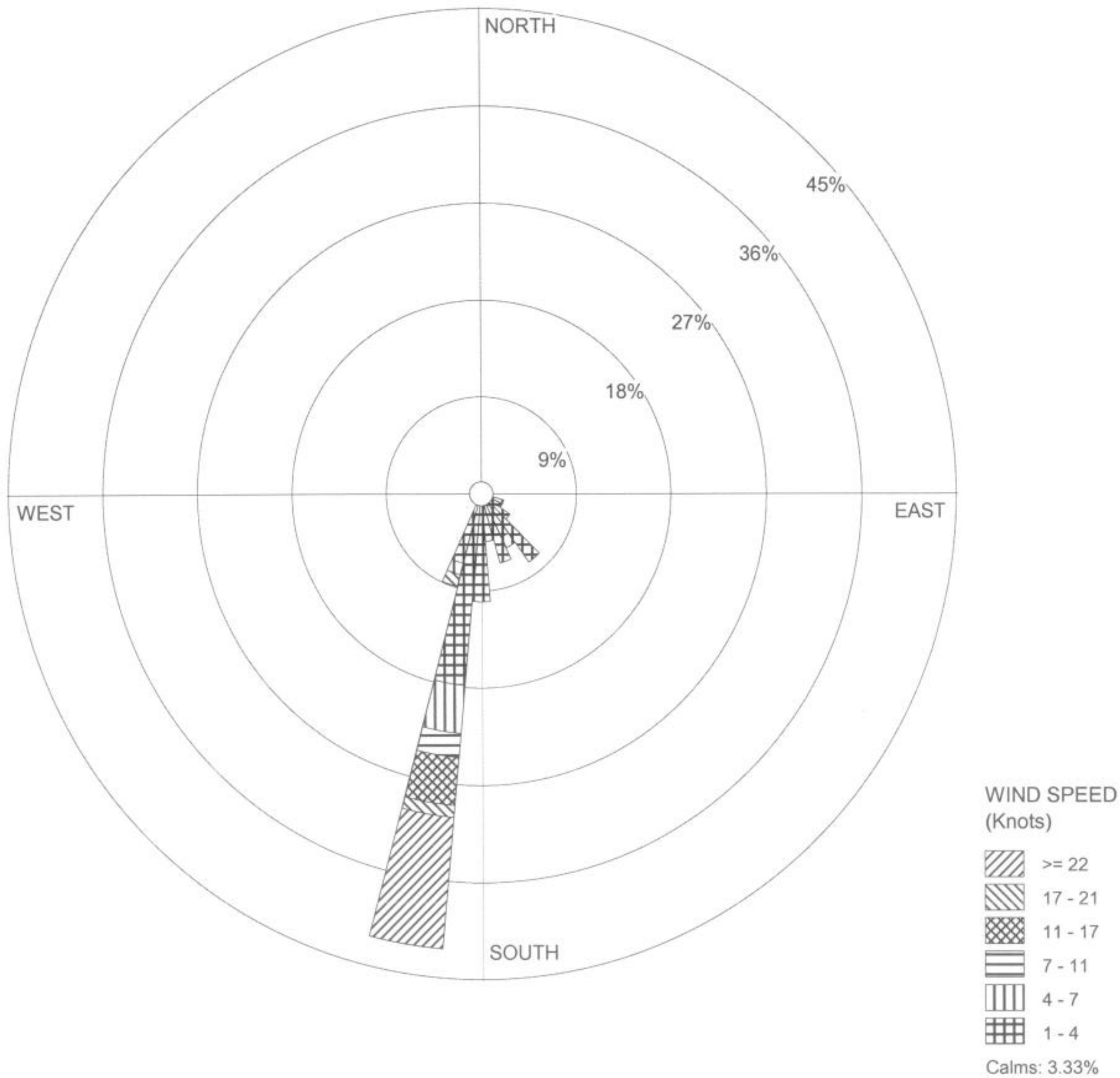
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

Velsicol Pine River
July 14-15, 2006 (24-Hour)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

TSP

DATA PERIOD:

2006
Jul 14 - Jul 15
00:00 - 23:00

COMPANY NAME:

CH2M HILL

CALM WINDS:

3.33%

AVG. WIND SPEED:

7.92 Knots

PROJECT NO.:

WRPLOT View - Lakes Environmental Software